

# AIRPORT SAFETY TECHNOLOGY—WASHINGTON NATIONAL AIRPORT

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## HEARING BEFORE THE SUBCOMMITTEE ON TRANSPORTATION, AVIATION AND MATERIALS OF THE COMMITTEE ON SCIENCE AND TECHNOLOGY U.S. HOUSE OF REPRESENTATIVES NINETY-EIGHTH CONGRESS

SECOND SESSION

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MARCH 21, 1984

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[No. 76]

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Printed for the use of the  
Committee on Science and Technology



U.S. GOVERNMENT PRINTING OFFICE  
WASHINGTON : 1984

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# CONTENTS

## WITNESSES

|                                                                                                                                                                                                                   |      |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| March 21, 1984:                                                                                                                                                                                                   | Page |
| Hon. Jim Burnett, Chairman, National Transportation Safety Board, accompanied by Dave Kelly, Chief, Operational Factors Division, Bureau of Technology; John Ferguson, Project Officer, Rosslyn approach issue... | 7    |
| Capt. Henry A. Duffy, president, Air Line Pilots Association, accompanied by John O'Brien, Director, Engineering and Air Safety Department.....                                                                   | 107  |
| J. Roger Fleming, vice president, operations, Air Transport Association of America.....                                                                                                                           | 112  |
| Joseph M. Del Balzo, Director, eastern region, Federal Aviation Administration, accompanied by Norbert Owens, manager, eastern region Air Traffic Division; and John Kern, Aviation Safety Office.....            | 119  |
| Appendix: Department of Transportation news release and Washington Post articles.....                                                                                                                             | 139  |

# AIRPORT SAFETY TECHNOLOGY—WASHINGTON NATIONAL AIRPORT

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WEDNESDAY, MARCH 21, 1984

HOUSE OF REPRESENTATIVES,  
COMMITTEE ON SCIENCE AND TECHNOLOGY,  
SUBCOMMITTEE ON TRANSPORTATION, AVIATION AND MATERIALS,  
*Washington, D.C.*

The subcommittee met, pursuant to notice, at 2:20 p.m., in room 2325, Rayburn House Office Building, Hon. Dan Glickman (chairman of the subcommittee) presiding.

Present: Representatives Glickman, Gore, Carney, Boehlert, and McCandless.

Also present: Senator Tribble and Representative Wolf.

Staff present: Curt Stanford, technical consultant; and Harriet J. Smith, minority technical consultant.

Mr. CARNEY [presiding]. The meeting will be called to order. Good afternoon, ladies and gentlemen. We apologize for the delay in the meeting. We were waiting for Chairman Glickman but unfortunately he is making some very important testimony before the Armed Services Committee at this present time.

We have a rather crowded calendar and he called over and asked not to delay the meeting any longer to accommodate our witnesses. So, we will do precisely that.

It is my pleasure to introduce to the members of the panel, as well as the people here at the meeting, a member, a distinguished member from the other body, the Senator from the State of Virginia, a colleague that once served with us very ably in the House of Representatives, Mr. Paul Tribble, the Senator from the State of Virginia.

Paul, I understand you have an opening statement.

Senator TRIBBLE. Thank you, Mr. Chairman.

I appreciate the opportunity to join you, and I must say, I would not have worked quite so hard to get to the Senate if I had known Republicans were chairing meetings in the House of Representatives. But it is a pleasure to join you.

Mr. Chairman, I asked to appear before the committee today because of the surpassing importance of this inquiry. We must leave no stone unturned in guaranteeing the safety of those who use National Airport and of those Virginians and other residents of the metropolitan area that live and work near this facility.

I am pleased that Secretary Dole has ordered accelerated installation of the new Localizer Directional Aid System at National Airport. This pilot guidance system, coupled with the new approach



procedure also accelerated by the Secretary, will greatly increase the margin of safety. More must be done, however.

I heartily endorse Frank Wolf's recommendation that additional pilot warning lights be installed on the USA Today Building. We must insure that every pilot approaching National Airport from the north is constantly aware of his position relative to that building.

The adequacy of National Airport radar is also another issue that I believe ought to be investigated. The radar should set off an alarm in the control tower whenever a plane strays too close to the Rosslyn buildings. During the past 16 months, there have been three verified near misses on the Rosslyn approach.

The day after the two latest incidents, FAA officials were quoted in the Washington Post as saying the alarm did not sound. I understand the Chief of the National Airport Tower will appear today, and I hope you will determine what was known about the two latest incidents; when it was known, and what response came from the tower.

The National Transportation Safety Board has strongly recommended the radar array be repositioned at the end of the main runway to a location on the other side of the Potomac River. This would eliminate interference from the Rosslyn buildings, it would increase safety, according to the NTSB.

However, FAA has responded, "There is no reason to doubt the facility operates in a satisfactory manner."

I am concerned the FAA may not have given sufficient consideration to the recommendation of the NTSB. I believe an independent study should be conducted of the National Airport radar system and warning procedures.

Finally, let me make one point that I am sure my colleague from Virginia, Frank Wolf, will pursue. The growth at National Airport will continue to create problems in the future. For some time, we have argued there should be some cap placed on the growth at National Airport. Flights should be taken to Dulles. We all believe that those flights would operate more safely in the environment surrounding Dulles Airport.

Mr. Chairman, Frank Wolf and I met with outgoing FAA Administrator Helms on the Rosslyn problems earlier this year. We will continue to do everything we can to insure the maximum safety of our constituents and the traveling public.

I want to applaud the leadership of this committee and I look forward to working with all of you to insure the safety of the skies, the safety of those good Virginians and other residents of this metropolitan area that live and work in the area of National Airport.

Mr. GORE [presiding]. Thank you, Senator. Do we have other opening statements? Mr. Carney.

Mr. CARNEY. Thank you, Mr. Chairman. My tenure as chairman was very brief but it was exciting nonetheless. [Laughter.]

Mr. Chairman, we all want to see the maximum possible safety in the operations at National Airport, indeed, all airports. Certainly, those of us who fly out of National regularly want to be assured that everything possible is being done to insure our safety.

No less concerned over our safety are the distinguished witnesses who have come here today to testify. Indeed, the Secretary of Transportation has made safety her No. 1 priority.

The FAA has been working with all the concerned organizations to determine why pilots have difficulty in flying the instrument approach that is used in bad weather, the VOR or DME runway 18 approach, and what could be done to aid the pilots in flying this approach and increase the margin of safety.

I understand that as a result of this cooperative effort, a number of steps are being taken which should enhance safety—some of which go beyond earlier recommendations of the National Transportation Safety Board.

While I certainly agree with my colleague from New York who so diligently called for these hearings, that the recent near-miss at the USA Today Building in Rosslyn was disturbing, I have to ask why we are having the hearings at this time.

I am sure that the organizations represented by our witnesses here today were equally disturbed and I am confident that the professionals at the FAA and the NTSB are working this problem as diligently as they possibly can.

Perhaps we should have waited and given the FAA and the National Transportation Safety Board an opportunity to complete the investigation of these incidents to learn exactly what happened, and determine whether the changes that are already in the works might have prevented them.

Not all of these changes are fully in effect because they involve the procurement of new equipment which has yet to be installed. Perhaps there are still additional steps that can be taken to enhance safety. But until the flight records have been analyzed and the investigations completed, it is premature to speculate on what these might be.

I hope the hearings are not permitted to stray from the announced purpose, namely, to look into the incidents involving the southbound approach to National Airport.

However, if the hearings can do anything to persuade the public that their concerns over safety are not being ignored and in fact that every effort is being made to make a very safe mode of transportation even safer, then perhaps there will be some positive outcomes from these hearings, and I certainly hope that will be the case.

Mr. Chairman, I thank you for the opportunity for an opening statement.

Mr. GLICKMAN [presiding]. Thank you. Mr. Boehlert.

Mr. BOEHLERT. Thank you, Mr. Chairman.

Today's hearings should not be necessary. If the FAA had followed the National Transportation Safety Board's recommendations last March, it seems likely that the incidents over Rosslyn this March never would have occurred. But the FAA did not go along with the Safety Board in December.

It should not be the goal of the FAA to adopt policies that will lead to the restoration of prayers in planes. Bureaucratic infighting and differences have to take a back seat to passenger safety. But all that is past.

Our focus this afternoon must be to insure that incidents like this that occurred on March 8 do not occur again. That, of course, will prevent tragic accidents in the future.

I am pleased to see that under the enlightened leadership of Secretary Dole, the FAA is finally implementing NTSB's recommendations—they are necessary and eminently reasonable.

The current approaches to National are the airport equivalent of a busy, dangerous, winding highway. What the FAA is doing is adding a shoulder and a guardrail. Still, questions remain. For example, malfunctioning of the minimum safety altitude warning system was cited as a problem in the NTSB report of March 24, 1983, and again in the Board's report this March. What is the problem and what can be done about it?

This month's incidents also highlight the need to discipline pilots who violate the minimum altitude regulations. What is being done about it?

And is the FAA continuing to make progress in implementing NTSB's recommendations? Can additional equipment be installed to insure greater safety?

Finally, an important long-term question remains: What can be done to eliminate the kind of bureaucratic wrangling that prevented the FAA from taking action for 9 months? That is too long a gestation period when lives are threatened.

This committee should take little comfort from statistics claiming that the chances of a plane hitting the USA Today Building are 7 in 10 million. We seem to be getting closer and closer to witnessing one of those seven accidents. The risk can and must be decreased. A tragic loss of life can easily be averted if the FAA continues to act as it has since December, and this subcommittee must do all it can to insure that that pattern is continued.

Thank you, Mr. Chairman.

Mr. GLICKMAN. Thank you, Mr. Boehlert. I want to commend you for being the catalyst behind these hearings.

Our witness is going to have to leave pretty soon, so Mr. Wolf, Mr. McCandless, do you have anything?

Mr. McCANDLESS. Nothing.

Mr. WOLF. Just a brief statement; I will submit it for the record. But I think it is important that we not only focus on the questions that have been asked, but there is a rivalry between the FAA and the NTSB, and these recommendations have been around for quite a while.

I think if one thing comes out of the meeting, that will be that these two groups get together in an appropriate spirit and try to do everything they can.

Second—and I think the question should be asked by everybody—is there anything else that can be done, other than what has already been done?

I thank the gentleman.

Mr. GLICKMAN. Mr. Gore.

Mr. GORE. In light of the time, Mr. Chairman, I will waive and question the witness.

Mr. GLICKMAN. All right. I have an opening statement. I ask it to be included in the record. I think that we called these hearings be-

cause of our frustration at seeing these continued news reports about close calls with giant structures in the Rosslyn area.

Except for Mr. Wolf and Senator Tribble, this is not a particular issue for us back home. The fact of the matter is, millions of people fly into this airport every single day and these airplanes are too damned close to existing buildings, and it is a disgrace.

As Mr. Boehlert said, the 7 in 10 million are not very comforting statistics to me if you are one of the 7, unfortunately. I have reason to believe that the FAA has modified-after a period of, I think, intense stubbornness-landing approaches to the south in inclement weather. Perhaps these approaches, these changed approaches, will make a difference in saving lives.

But we do not call these hearings because we think that there are other things that we ought to be doing. We called these hearings because we are afraid that lives are at risk unless there is more serious attention to changing that landing approach so that people are not at risk.

I know that the millions of people who fly into that airport every year demand no less.

[The opening statement of Hon. Dan Glickman follows:]

## OPENING STATEMENT

HONORABLE DAN GLICKMAN, CHAIRMAN  
SUBCOMMITTEE ON TRANSPORTATION, AVIATION AND MATERIALS

MARCH 21, 1984

AIRPORT SAFETY TECHNOLOGY --  
NATIONAL AIRPORT APPROACH PROCEDURES

TODAY THE SUBCOMMITTEE WILL RETURN TO A SUBJECT THAT WE FIRST CONSIDERED LAST SUMMER -- THE SAFETY OF OUR AIRPORT SYSTEMS.

I SAID THEN THAT AIRPORTS REPRESENT THE MOST CRITICAL JUNCTURE IN AIR TRANSPORTATION. OVER HALF OF ALL CIVIL AVIATION ACCIDENTS OCCUR AT OR NEAR AIRPORTS. SO, IT IS APPROPRIATE FOR THIS SUBCOMMITTEE TO EXAMINE AIRPORT SAFETY TECHNOLOGY GENERALLY, ALONG WITH SPECIFIC CRITICISMS OF CERTAIN AIRPORTS.

IN OUR HEARINGS LAST SUMMER, WE LOOKED SPECIFICALLY AT THE NORTHERN APPROACH PROCEDURES TO NATIONAL AIRPORT. WE DID THIS BECAUSE OF REPORTS THAT AIRLINERS HAD, ON OCCASION, COME DANGEROUSLY CLOSE TO THE USA TODAY BUILDING IN ROSSLYN, VIRGINIA, DURING THEIR LANDING APPROACH TO NATIONAL AIRPORT. AFTER HEARING TESTIMONY FROM THE FAA, THE NTSB, AND OTHERS, THE SUBCOMMITTEE FOUND THAT SAFETY AT NATIONAL AIRPORT COULD BE IMPROVED BY REALIGNING THE NORTHERN APPROACH AND BY UPGRADING THE SO-CALLED "MINIMUM SAFE ALTITUDE WARNING SYSTEM".

THE SUBCOMMITTEE WAS PLEASED TO HEAR THAT THE FAA HAS MODIFIED AND IMPROVED THE APPROACH PROCEDURES AND EQUIPMENT FOR NATIONAL AIRPORT. HOWEVER, THE RECENT REPORTS OF JET AIRCRAFT PASSING THE BUILDINGS AT ROSSLYN AT AN ALTITUDE OF 500 FEET, OR PERHAPS EVEN AS LOW AS 400 FEET, CONTINUE TO BE OF SERIOUS CONCERN TO THE SUBCOMMITTEE. THESE ALARMING INCIDENTS RAISE NEW QUESTIONS ABOUT THE APPROACH PROCEDURES TO NATIONAL, THE MINIMUM ALTITUDE WARNING SYSTEM, AND THE ARTS-3 ANTENNA AND OTHER EQUIPMENT UPON WHICH THE SYSTEM RELIES.

I AM HOPEFUL THAT THE SUBCOMMITTEE CAN BE A POSITIVE INFLUENCE ON RESOLVING THE CONFLICTING OPINIONS ON THIS VERY SERIOUS MATTER, AND THAT WE CAN IDENTIFY STEPS WHICH SHOULD BE TAKEN TO ASSURE THAT THE APPROACH TO NATIONAL IS THE SAFEST POSSIBLE IN ALL TYPES OF WEATHER CONDITIONS. I WELCOME THE EXPERT WITNESSES WHO HAVE AGREED TO ASSIST US IN THIS EFFORT TODAY.

**Mr. GLICKMAN.** It is our pleasure to have as our first witness a very competent person, Jim Burnett, Chairman of the NTSB.

We know you have to leave at 3:15. So, your entire statement will appear in the record, Jim, and you may summarize it if you wish.

**STATEMENT OF HON. JIM BURNETT, CHAIRMAN, NATIONAL TRANSPORTATION SAFETY BOARD, ACCOMPANIED BY DAVE KELLY, CHIEF, OPERATIONAL FACTORS DIVISION, BUREAU OF TECHNOLOGY; JOHN FERGUSON, PROJECT OFFICER, ROSSLYN APPROACH ISSUE**

**Mr. BURNETT.** Mr. Chairman, it is very good to be with this committee again.

I have with me to my right Mr. Dave Kelly who is the Chief of our Operational Factors Division in the Bureau of Technology at the Safety Board. By the way, Mr. Kelly is a pilot and former air traffic controller.

On my left, Mr. John Ferguson who is a retired airline captain of many years experience and has been the NTSB's Project Officer for the Rosslyn approach issue ever since we began the investigation of the Piedmont incident in January 1983.

Mr. Chairman, I am going to rather liberally paraphrase my statement and begin with a review of how we got to this point.

On December 28, 1982, the public reported and made complaints which were picked up in the press of the passage of a Piedmont aircraft very near the USA Today Building in Rosslyn. That was reported to me after the FAA had made an initial determination that it did not happen.

I, because of the concern that I have had and that had been expressed by the public about the approaches to Washington Nation-



al, requested that our investigators look into it, and subsequently we obtained the radar tracking as to that airplane as well as the data recorders and established that the Piedmont aircraft had passed to the right of and well inside the 500-foot lateral distance that is to be maintained between their track and the USA Today Building, and at approximately the height of the building. In other words, it was approximately 400 feet altitude and the building is 396 feet.

We then went forward with preparing recommendations to the FAA as to how to keep this from happening, and we issued those recommendations on March 24, 1983.

The FAA did not respond to us until July 5, 1983, and at that time they sent us a letter which in three cases said that they did not concur and in the other case said that they nonconcluded with the recommendations.

We then began working because of the deep concern on the part of our investigators who were involved that we had a serious problem. The FAA took the position that it was, you know, one of these one-of-a-kind incidents that never happened before and would never happen again.

We began preparing a reply letter to the FAA which we hoped would be forceful enough to sort of wake everyone up on this matter. We issued that on November 21, 1983, giving them an unacceptable action rating on all of our recommendations. Because of subsequent news reports, the interest of this committee and the Washington area delegation and the intervention of the Secretary of Transportation, Secretary Dole who is, I find, very concerned with transportation safety issues, the FAA reconsidered and sent us a letter on December 21, 1983, accepting all of our recommendations except those that dealt with the minimum safe altitude warning system, at least in effect expecting our mooted the ones that were not accepted because of other corrections.

This was, I think, done somewhat grudgingly but nevertheless forthrightly by the FAA because of orders from above. Then, on Valentines Day of this year, one of our NTSB staff members—in fact my special assistant—observed another aircraft flying very low between the USA Today Building and 14th Street Bridge.

This was somewhat different in the perception of the aviation people because it was reported by an experienced pilot. So, the FAA began, I think, at that time to realize that perhaps they had a larger problem than they had admitted. But we already had in course several of the recommendations that we had made.

One, to go into effect March 15 was to implement the visual dissent point which would make it absolutely mandatory for no aircraft to descend below 720 feet on that approach until they were 1,800 feet past the USA Today Building. That, in itself should, if enforced by the FAA and I think they need a special surveillance effort to be sure the pilots are obeying that even though it is now in effect, should itself take care of the problem.

However, before we reached the March 15 date, we had two more incidents that took place on March 8. The first was a Pan American aircraft that passed the USA Today Building probably at 500 feet and possibly well inside the lateral distance that it should have passed. The other, and I think the most serious, was an East-

ern Airlines flight which was supposed to have remained at 900 feet well past the USA Today Building.

In effect, according to radar tracking, it had come down to lower than 400 feet, which is close to the height of the USA Today Building, well before reaching that building, which is located here.

When we looked at the flight data recorder we get a much more accurate measurement of altitude, we found that that aircraft was actually down to 365 feet. When it had actually passed the USA Today Building, it had climbed up again to something around 500 feet—perhaps 100 feet over the roof of that building.

But rather than being 500 feet to the east as it should have been, our track takes it very close to the building. Ours was compared by computer. The FAA did a hand-drawn track which takes it right over the building, and we have one credible witness who was on the ground who saw the aircraft pass directly over the building.

So, it may have been in a situation where it was climbing in order to get over the building.

Senator TRIBLE. Mr. Chairman, can I ask a question at that point?

Mr. GLICKMAN. Yes.

Senator TRIBLE. Are you telling us that this plane was lower than the height of the building before it got there?

Mr. BURNETT. That is right.

Senator TRIBLE. And then was on the way back up again when it flew directly over the building?

Mr. BURNETT. That is correct.

Senator TRIBLE. So, if it had not started climbing again, it would have crashed right into the building itself.

Mr. BURNETT. We do not have nearly as exact information about the horizontal placement of the aircraft as we do the altitude.

Senator TRIBLE. Except your eyewitness.

Mr. BURNETT. I cannot say that it would not have been able to miss the building had it not been able to climb.

Senator TRIBLE. But you had an eyewitness that said it was directly over the building at the time it got to that point.

Mr. BURNETT. We have an additional complication. Immediately to the north and closer to the point where the aircraft reached its lowest altitude, we have another building under construction which has been NotAm by the FAA, noticed airmen.

There is a crane involved in that construction that reaches 463 feet, higher than the USA Today Building. Now, we do not know the positioning of that crane, whether it was actually at that altitude on that day. Since they probably were not working at that time, it may not have been.

But there may have been some other potential hazards also.

Mr. GLICKMAN. May I ask you a question?

Mr. BURNETT. Yes.

Mr. GLICKMAN. Have you interviewed the pilot of that particular plane?

Mr. BURNETT. No, Mr. Chairman, we did not want to do that until we had completed our tracking so we would know what in fact we had before we interviewed the pilot.

There may be some enforcement action here, so I am not sure that we are going to accomplish very much. We cannot character-



ize why the plane was, where it was, or why it was climbing without, of course, having the statement from the pilot. Whether they are going to be willing to do that, the crew, under circumstances in which there may be an enforcement action is questionable.

I think, from the standpoint of the Safety Board the most important thing is that we had an event which should not have happened, that is clear. Exactly how close it was to a collision in feet and inches is not our true concern. The point is that it was too close, that is obvious.

The Safety Board wants to put its time and effort right now in finding explanations that would help us to prevent the situation.

Mr. BOEHLERT. Mr. Chairman, may I at this point ask a question?

Mr. GLICKMAN. Sure.

Mr. BOEHLERT. It is my understanding that you reviewed the tapes of the other flights on that day; is that correct?

Mr. BURNETT. Yes, we have.

Mr. BOEHLERT. And there were some indications that there may have been several more near-misses?

Mr. BURNETT. That is correct.

Mr. BOEHLERT. Do you have any figures on that?

Mr. KELLY. I have some figures. Between the hours of 14:55 and 17:29, we evaluated 46 flights, the recorded radar data from National Airport pertaining to 46 flights landing at National during that time period.

Mr. BOEHLERT. You evaluated 46 flights?

Mr. KELLY. Yes, sir.

Mr. BOEHLERT. Well, how many of those 46, is there an indication based upon your review?

Mr. KELLY. Of those 46, 9 of those flights alerted the minimum safe altitude warning system. On two of those, the controller issued an advisory to the aircraft.

Mr. BOEHLERT. What about the other seven, why was not an advisory issued?

Mr. BURNETT. Well, that is the subject of our additional investigation. We do not know that at this time. But if I could continue.

Mr. GLICKMAN. Go ahead.

Mr. BURNETT. This is very much a bad news-good news-bad news story. It is unfortunately not a joke, it is very serious.

We have a problem and it has been proven now to be a problem. The good news is that everybody concerned, I am now convinced, realizes that we have a problem and are committed to doing something about it.

It could have been done a long time ago, but it was not. I do not think the public needs to be concerned that anyone is at this point dragging their feet on correcting it. We have already in effect the visual descent point. We need special FAA surveillance to be sure that that is enforced, and the word to get out to all the pilots that are flying into Washington National that they are going to be subject to special surveillance so that there will not be any temptation to duck under on days of low ceiling.

Then we will have, originally previously scheduled in September, the new LDA approach. It has now been moved up to mid-August and as far as we can determine, that is as fast a track as can be put on.

So, those two things should take care of the problem.

However, we have another area that is of even higher concern for the Safety Board and that is what Mr. Kelly has just referred to. We have a minimum safe altitude warning system in Washington National, as well as at other major airports. This was adopted in part because of Safety Board recommendations that arose from accidents involving aircraft which flew into the ground or which flew into structures such as the American University tower in the District of Columbia.

For some reason, that system in Washington National is not operating properly. After the Piedmont investigation the Safety Board believed that the buildings around Washington National Airport were masking the radar signals. We had suggested that the MSAW be moved in order to give a better radar communication.

At that time, the FAA had told us that there had been no MSAW alarm sounded in the tower at the time of the Piedmont incident. They told us the same thing when we asked them about the alarms that may have been sounded at the time of the Eastern and Pan American incident on March 8.

However, we have—as Mr. Kelly indicated—checked the tapes and we have indications that there was a radar response on at least nine occasions on March 8. And yet, the controller only gave two warnings to the pilots.

Now, there can be several things happening there. One is that the radar signal may be being received and there may be something wrong with the oral warning system or the visual display so that the controller is not getting the message.

Another possibility is that there may be so many of these and you have to realize that the same oral warning is given for MSAW as is given for a conflict alert and because of the aircraft that are approaching and turning around Washington National, you get a lot of conflict alerts from routine situations.

So, it is possible that aircraft controllers may be tuning out this, where the silence becomes more significant than the alarm.

It also may be that they are being ignored or it is assumed they may be happening frequently enough without incident that they have been written off as being sort of irrelevant. That is what we have to pursue. The Safety Board is going to continue doing that very closely.

In the meantime, I believe that the actions that are now on course will be sufficient to take care of the approach problem that we have that has been presented. However, there may be other reasons that we will need an MSAW system other than this approach, and the ineffectiveness of that system is certainly a matter of concern to us and may go beyond Washington National.

This may be a problem that exists all over the country and we have to resolve that.

Mr. Chairman, this concludes the summary of my statement. We will be glad to respond to questions.

[The prepared statement of Hon. Jim Burnett follows:]



**National  
Transportation  
Safety Board**

**Safety Information**

Washington D.C. 20594

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TESTIMONY BY HON. JIM BURNETT  
CHAIRMAN, NATIONAL TRANSPORTATION SAFETY BOARD  
BEFORE THE  
HOUSE COMMITTEE ON SCIENCE AND TECHNOLOGY,  
SUBCOMMITTEE ON TRANSPORTATION, AVIATION, AND MATERIALS  
March 21, 1984

Mr. Chairman and Members of the Subcommittee, thank you for your continuing concern about the safety of what has come to be called the Rosslyn Approach to National Airport.

We at the National Transportation Safety Board share that concern. In fact, you may recall I raised the issue in testimony before this Subcommittee last July. At that time I reported that the Safety Board had conducted an investigation after receiving reports of a Piedmont Boeing 737 coming dangerously close to the USA Today building in Rosslyn.

Today, some 15 months after the Piedmont incident, I can say I have several bits of good news and some bad news. The bad news is that as recently as March 8 a series of aircraft passed dangerously close to the USA Today building. I can only say, based on that one day's experience, that our earlier cause for concern is now a cause for alarm.

On the other hand, the good news is that the Federal Aviation Administration -- recently inspired by Secretary Dole -- has come to recognize the catastrophic potential and has begun to take steps to reduce the risk to airline passengers and building occupants alike.

Before I continue with where we've been on this issue and where I hope the FAA is going, I'd like to introduce two members of the Safety Board staff here with me this afternoon. To my right is Mr. David Kelley, Chief of our Operational Factors Division and a pilot and former air traffic controller. On my left is Mr. John Ferguson, an experienced airline captain, who, for many years, has been one of our senior operations specialists. He has spent a considerable amount of time looking into the the southbound instrument approaches at National Airport.

Following the December 1982 reports by ground witnesses about a low flying aircraft -- which incidentally were discounted by the FAA as an optical illusion caused by the low cloud cover-- the Safety Board conducted an investigation. We obtained recorded air traffic control radar data form National Airport and the flight recorder from the aircraft involved.

Our conclusion? The B-737 was at an altitude of about 400 feet when passing the 396-foot high structure. In addition, the flight had drifted to the right on its southbound course, placing it nearer to the building than it normally should have passed.

My colleagues on the Board and I recognized the implications of such an occurrence and, after considerable study of possible preventive measures, directed four safety recommendations to the FAA Administrator.

The recommendations reflected certain findings about the instrument approaches to Runway 18 that I want to share with you. The VOR/DME Runway 18 approach -- that is, a Very High Frequency Omnidirection Range Station -- is a nonprecision approach in that the signal it generates provides no vertical descent path guidance.

Approach altitudes are regulated by the approach chart pilots use. It depicts a series of stepdown descents from an altitude of 3,000 feet at the 10-mile DME fix (distance measuring equipment fix) down to 900 feet at the 3-mile fix. After that point, the pilot may descend to 720 feet, which is the MDA, or minimum descent altitude for the approach. This minimum altitude must be maintained until the intended runway environment can be distinctly identified, at which time the airplane can be descended visually at a normal rate. The pilot may not descend below the 720-foot level unless the necessary visual references to the runway are realized.

The Safety Board said in its recommendation to the FAA that a practical way of eliminating premature descents in search of the runway environment would be to add a visual descent point (VDP) requirement to the VOR/DME approach to Runway 18. The visual descent point we proposed would intersect the 720-foot minimum descent altitude at a point approximately 1,800 feet closer to the airport than the highest building in Rosslyn.



In other words, aircraft could not leave the 720-foot level until they were well beyond the 396-foot building at 1000 Wilson Boulevard.

Again, after initial rejection, the FAA has now adopted this recommendation. The visual descent point we recommended for the VOR/DME approach became effective last Thursday, March 15. Certainly, this is in the good news category.

This VDP is located at the 2.2-mile DME fix.

In recounting the background, I'd like to jump ahead at this point and note that had the VDP been in effect and adhered to, the incidents we are investigating would not have occurred during the afternoon of March 8.

Another recommendation that was initially rejected was for a shift of the Localizer Directional Aid (LDA) approach course to bring it closer to the Potomac River -- or even coincident with the inbound course of the VOR/DME Runway 18 approach I've just discussed.

Ironically, the existing LDA approach, which can only be used when weather is better -- that is, the ceiling is higher -- actually provides a pilot with some vertical approach path guidance along with directional guidance. The problem is that the approach path guidance runs out at 1,100 feet and for that reason cannot be used when the ceiling is below 1,100 feet.

A subsequent response to our recommendation concerning the localizer approach has been much more positive. The FAA now proposes to create a second LDA with an inbound course that would coincide with the inbound course of the VOR/DME Runway 18 approach.

The good news here is that the second LDA will provide an electronic glideslope down to the minimum descent altitude of 720 feet. Significantly, the altitude will not be reached until airplanes are inside, that is closer to the airport than, the USA Today building.

We are sure you will join us in exhorting the FAA to do all it can to speed the installation of this second LDA. I might note at this point that we have read encouraging words in this regard. The original target date for commissioning the LDA was September 30 of this year -- some 2 to 3 months earlier than with an average installation time. We now understand the FAA is targeting the LDA to be operational by mid-August.

This second LDA will provide a safer approach to Runway 18 and become the primary instrument approach, thus relegating the VOR/DME approach to backup status.

Incidentally, I'd like to mention for the record that a third Board recommendation -- for changes in the VOR/DME approach chart -- should be obviated by the installation and use of the second LDA.

This brings me to the status of the fourth recommendation and some frankly very disturbing findings as a result of our investigation into the flights over Rosslyn on March 8.

On that date one Boeing 727 -- specifically Eastern Airlines Flight 1483 -- prematurely descended in an area where it should have been at 900 feet. The airplane continued to descend and was at about 400 feet as it crossed the 3-mile DME fix. This DME fix is reached before the airplane clears the USA Today building. The flight then climbed back to about 500 feet during its approach as it passed near the building.

The Board's recommendation letter of last March expressed concern over the reliability of the Minimum Safe Altitude Warning -- MSAW -- that is supposed to alert controllers to aircraft descending to unsafe altitudes. They, in turn, are supposed to advise the flight crew of the low altitude warning. We were concerned that the MSAW system might not alert National Airport tower personnel at a critical time, with disastrous consequences.

As our current investigation has shown, the situation is much worse than we might have imagined. In fact, everyone we spoke to at the FAA assured us that there were no MSAW alerts during the period in question involving at least four low-flying aircraft.

Incredibly enough, however, the objective data we were able to obtain from replaying the radar tapes showed that there were 9 separate MSAW alerts during a one-hour period. A transcript of tower communications showed that during that period only two alert advisories were given to aircraft.

And what about Eastern's Flight 1483? The recorded radar data show that MSAW warnings did -- or should have flashed on the controller's screen for about 30 seconds as the airplane's transponder reply indicated it was too low. The MSAW sounds an audible alarm, yet the transcript shows no alert advisory was given to the crew of Flight 1483.

Three other flights passed the building at altitudes of about 500 feet -- some 200 feet below the safe altitude at that point -- and activated, or should have activated, the minimum safe altitude warning. Again, the transcript shows the controllers did not advise the aircraft.

At this point, Mr. Chairman, we are unsure whether the reliability problems with the MSAW that we first detected have been resolved. What is clear -- and it is no pun to say that the finding is alarming -- is that on March 8 when an aircraft actually descended to approximately rooftop level of the highest building in Rosslyn the MSAW system either failed to function as intended or the controllers failed to respond and provide an advisory to the aircraft involved.

At the risk of belaboring the point, it should be understood that the flight crew initiated a climb after passing the 3-mile DME. For all that tower personnel could have known, the aircraft might have continued its approach descent on its way to Runway 18.

The Safety Board is, of course, continuing to study the situation to determine if there is a reason why low altitude alerts were not transmitted to the flightcrews of several aircraft.

Incidentally, I would like the Subcommittee to know that I have learned from my staff that the warning horn that sounds to supplement the MSAW alert on the controller's screen is the same one that sounds for a conflict alert. As you know, the computer may generate conflict alerts by projecting the path of aircraft at a time when they are actually turning or engaged in another maneuver that will maintain proper separation. In such instances these conflict alerts are, if you will, necessary nuisance alarms.

By no means do I wish to suggest that this indistinguishable warning horn was in any way responsible for the events -- that is the lack of action -- of March 8. In fact, that is unlikely since most conflict alerts sound during VFR conditions -- that is on clear days when pilots acknowledge the presence of nearby aircraft and take responsibility for maintaining separation.

Nevertheless, I have asked our staff to look into the question of the practicality of recommending that the FAA create different audible warnings so that controllers may instantly distinguish between a conflict alert -- which may be a nuisance alarm -- and an MSAW alert that is always the real thing.

Our investigation is continuing and I believe I have conveyed all we know to this point, but I will be happy to attempt to answer any questions you may have.

Mr. GLICKMAN. Let me just start this thing.

What you are basically saying is, that the FAA's proposed changes, and you have listed those in your statement, once fully implemented, satisfy your concerns about the landing approach to this airport.

Mr. BURNETT. Yes.

Mr. GLICKMAN. When you testified last summer, you said that you would be very hesitant to rent an office on the top floor of the USA Today Building or some of the other buildings in the approach area. Do you still feel that way?

Mr. BURNETT. Much less so than I would before because now I know that everyone involved in this problem knows it is a problem.

At the time I testified, the NTSB, we were a voice crying in the wilderness. Because of what happened on March 8 and, I think, also even before that on the 14th of February, we are no longer alone. I think the things are being done that must be done to correct it.

Mr. GLICKMAN. Now, let me ask you again about this approach. What are the current requirements on ceiling when you land to the south, what is your minimum ceiling that you can have at this airport when you land to the south?

Mr. KELLY. Well, there are two different approaches, Mr. Chairman. The VOR DME approach that was in use on March 8, the minimum descent altitude is 720 feet.

The current LDA approach that is in force has a minimum descent altitude of 1,100 feet. So, when the weather goes below 1,100 feet, the VOR DME runway 18 approach is put into use.

Mr. GLICKMAN. Now, do you believe that airplanes were violating that 720-foot ceiling periodically prior to the time that it was changed to 1,100 feet? I mean, were pilots bringing in planes at a lower ceiling than they were supposed to?

Mr. BURNETT. We obviously have several proven examples of it, and we believe it was happening on other occasions.

Mr. GLICKMAN. Do you also believe that in light of your testimony that there were nine examples of alerts or whatever you would want to call them, that we had a clear pattern of repetitive behav-



ior where airplanes were flying too close, too far off course? This was perhaps happening every time there was this marginal inclement weather occurring, would that be a fair statement?

Mr. BURNETT. Well, I think what is unusual about some of the incidents that we have discussed today has been the fact that you had not only a flight lower than it should have been but also nearer to the buildings laterally.

I do not know, I hope we certainly have not had any other instances other than the ones we have documented, in which that has happened, but we could have.

Mr. GLICKMAN. Mr. Burnett, what are we going to do about these buildings in Rosslyn? I mean, I do not advocate tearing them down. But do you think that with the 1,100-foot standard that these buildings no longer present any safety problem for flying passengers in the area?

Mr. BURNETT. I believe that a safe approach can be made to Washington National even with that building and others of no greater height in the Rosslyn area.

I think at the time they were built, the FAA should have made a determination either to object to their being constructed or to do those things that were necessary to provide for a safe approach.

The buildings were constructed and nothing was done to provide for a safe approach in light of the buildings being there, and that is now being done.

Mr. GLICKMAN. Now, the FAA argues that they do not have any effective enforcement powers to prevent the building of buildings or obstructions near airports.

Do you concur with that?

Mr. BURNETT. My understanding is that they have no means to keep someone from building a building. They can advise the zoning authorities or whoever has to issue the building permits in the local area, that they have reservations and they can discontinue the use of the approach, which can have a massive impact upon the local airport.

So, I would not want to say that they do not have any influence over the building of buildings in an aircraft approach path, they certainly can influence it. They do not have any direct authority to prevent it.

Mr. GLICKMAN. A final question. How would you characterize the FAA's conduct in dealing with this problem during the past year, both before they changed their standards and afterwards?

Mr. BURNETT. Well, I think there were two problems initially, Mr. Chairman.

One, the FAA made their own investigation before we did, which was quite proper, and they determined—perhaps preemptorily—that there was no problem.

I think there was a good deal of resentment when the Safety Board elected to take this incident investigation. We do not have to do incidents and we can only do a few, that we established that there was a problem.

The initial reports came through the press and through the citizens, which I find within the aviation community sometimes tends to be discounted. They certainly took the attitude that the NTSB

was all wet. It was not until we had a second incident that we could document that that began to change.

I am sure that the people involved in that are concerned about safety, but we all have our institutional perspective that influences us sometimes, and sometimes very unfortunately.

Certainly, once the Secretary of Transportation became aware of this issue and became concerned with it, we got a very quick change, at least in cooperation. It may not have been enthusiastic but it was nevertheless, I think, effective.

Now, I think, we have everybody just—you know, a convert sometimes becomes your zealot. I think that is probably the case with this issue.

Mr. GLICKMAN. Well, I would just conclude by saying that I think that the FAA has shown a great amount of arrogance in dealing with this issue where the risk to be perceived in crashing into one of these buildings is so very great that I think they took very lightly the safety problems that you were presenting to them over, and over, and over again, and which we in this committee and Congress did the same thing.

Without your persistence and a few diligent aviation spotters in the sky, we might have had an accident at that building. So, I think that the NTSB, under your leadership, needs to be commended on this.

Mr. Carney.

Mr. CARNEY. Thank you, Mr. Chairman.

Indeed, it is a pleasure to have you here again, Mr. Burnett, and I echo the same sentiments as the chairman for the job that you are doing over at the National Transportation Safety Board.

You stated in your statement to the panel that if this VDP had been in effect and adhered to, the incident on March 8 would not have occurred.

But is it not true that if the procedures in effect at that time had been adhered to, that there would not have been any incident anyhow?

Mr. BURNETT. Well, I think at least as to the Eastern incident, that is true. There is some question as to whether the FAA had any really enforceable regulation that would have kept aircraft from ducking under if they were able to get the runway environment in sight and established a stabilized flight path.

Clearly the Eastern—well, I guess I should not say that. This case could potentially come to the NTSB on appeal from FAA enforcement action, and I will not comment on the particular circumstances of Eastern except to say that they were not in a stabilized flight path if they were at 365, climbing back to 500.

But the visual descent point gives the FAA something that they can enforce. I think it needs some intensive surveillance on the part of the FAA which I would think should include routinely pulling the radar tapes to check to see if aircraft are ducking under and, I think, perhaps even some visual observation by FAA personnel.

Mr. CARNEY. Let me ask you, it must be rather difficult for you to answer some of the questions today, given the timeframe of this hearing vis-a-vis the investigation; would that be correct?

Mr. BURNETT. Yes. I do not know how much farther we are going to get into this on trying to determine what happened because I think on March 8, except following up the insult problem, I think the remedial effort that we can achieve right now needs to be focused on that problem because it is serious as it applies to Washington National.

We know there is a problem. We do not know what it is exactly. You might make some guessing, but that is all it is. And it may be a problem that is all over this country.

So, that needs to be the focus of our activity, trying to determine the enforcement case which is up for the FAA to initiate and for us eventually to decide is really not our job at this stage.

Mr. CARNEY. The case that you have on the 8th, though, we have some type of difficulty. See, I have some questions I want to ask and I am kind of hesitant to do so since you are still investigating.

Mr. BURNETT. Please, go ahead and direct the questions to us, and if we cannot answer them, we will say so.

Mr. CARNEY. You stated that the FAA initially rejected your recommendation to shift the existing LDA approach, but you failed to mention that there were tradeoffs involved in simply shifting the approach.

That in fact the existing approach is the preferred approach most of the time. Would you not agree that the FAA solution of retaining that approach while adding a localizer to the present VOR DME approach is a much better solution?

Mr. FERGUSON. The existing LDA turns the airplane loose at 1,100 feet, and the crew is then to fly visually to the airport. We do not have a chart of the LDA approach but you will see a solid line from the point at which the flight reaches 1,100 feet, which is half a mile north of the center of Rosslyn. It is a left turn over the river and in with no prescribed altitudes from that point on into the airport.

Now, the new LDA that the FAA has proposed, will overfly the inbound course of the VOR DME, will bring the aircraft down to 720 feet, which will bring it inside, just inside, the USA Today Building. It has a glide slope so that that will give the aircraft or the pilot vertical guidance.

The ILS or the LDA is a tighter approach than on a VOR DME, but will keep it basically where it is going and it will bring the crews further down beyond those tall buildings before they are turned loose.

Mr. CARNEY. But what about the question of whether you agree with the FAA solution of retaining the approach while adding the localizer to prevent the other approach, even though the other approach is better.

I am looking for a "yes" or "no" answer.

Mr. FERGUSON. I do not know if I can answer it "yes" or "no." The FAA gave us a reason for it; they claimed it was environmental and it aided in bringing aircraft in for the visual river approach.

We originally recommended that that LDA be moved over. I think you are going to have to ask the FAA for their reasons for maintaining the original LDA.

Mr. CARNEY. It seems like their recommendation accommodated both, though, was the point I was trying to make.

Mr. BURNETT. Initially, Congressman, they were not going to do anything. It was, you know, "no, no, no," to all of our recommendations. We are always quite willing to receive from the FAA an answer that says, "Well, we cannot do this but we can solve the problem by doing this." If they have an alternate action, that is always pleasing to us.

Mr. CARNEY. On December 21, the FAA had agreed to implement all your recommendations; is that not correct?

Mr. BURNETT. All but those that deal with the MSAW, either implement them or do something that would be the equivalent.

Mr. CARNEY. Let me ask you a question about ducking under. You keep referring to that when you answer questions. Is there a human-nature thing involved where a pilot wants to get to see what is underneath him, and that is why he has a tendency to duck under?

Mr. BURNETT. Mr. Ferguson has flown that approach many times, I will let him respond to that.

Mr. FERGUSON. That is a possibility, sir. But when the MDA is reached, minimum descent altitude on a nonprecision approach—and a nonprecision approach means an approach that does not have an electronic flight path—the FAR, the Federal air regulation that determines when the pilot should leave that MDA is when he receives some of the runway environment. That could be the approach lights or it could be the runway and identify lights, or it could be the threshold of the runway or the runway itself.

At any time the pilot sees any one of those, and since the approach lights is in the plural, if he sees two approach lights, and he believes that he can make a normal descent to that runway with a touchdown, he can leave his MDA.

Now, this is not a very objective way of allowing an aircraft to leave its MDA.

Now, with the installation of the VDP, the visual descent point, which can be read on an instrument in the cockpit at 2.2 miles out from the VOR station, it is a DME fix, that aircraft will maintain 720 until that point is reached and then he will be able to descend on what we believe is a normal flight path of 3 degrees, 3 degrees down to the touchdown point.

So, it is taking that subjective view away from him and maintaining that aircraft at the MDA 720 feet until he can make that normal approach to the airport.

Mr. CARNEY. In other words, no matter what he sees visually, until he hits that 720-foot altitude mark at 2.2 miles out, he has to stay above 720 feet.

Mr. FERGUSON. Yes, until he hits 2.2 miles out he maintains an altitude in excess of 720 feet. Yes, that is correct.

Mr. CARNEY. I do not think anybody would have a quarrel with that. But still, if I could go back to Mr. Burnett, I still do not understand what you mean in your constant reference to "ducking under," is this something that happens frequently? Is there a reason, the pilots save fuel, save time?



Mr. BURNETT. Well, in order to be able to land, you have to get the runway in sight. So, they are trying to accomplish that as quickly as possible.

I do not want to characterize, on the basis of the investigation that we have done, the motives of pilots. We do know that there is something taking place there, and I think perhaps there will be further witnesses here that might enlighten us on the reasons that might be done. But it obviously is happening on occasion.

Mr. CARNEY. One last question, and I yield back to the chair.

Regarding your fourth recommendation to move the antenna site, are you still recommending that this be done?

Mr. BURNETT. I am not sure that we would recommend that at this point because we now know that there may be other problems with the MSAW, that in fact the radar signals may be being received. So, I think we need to take another look at that whole issue.

I think neither we nor the FAA at this point know exactly the nature of the problem that we have.

Mr. CARNEY. Thank you. Thank you, Mr. Chairman.

Mr. GORE [presiding]. Thank you. I will take my time to ask some questions at this point.

Mr. Burnett, let me begin by adding my compliments to those you have already heard. I have stated on previous occasions that I think you are one of the best appointments that this administration has made and I appreciate your hard work and dedication on this.

Let me come back to the question that I interrupted your statement with. This was on March 8, this incident; is that correct?

Mr. BURNETT. That is correct.

Mr. GORE. Now, let me get it clear in my mind. This plane was coming in from the north; is that right?

Mr. BURNETT. Southbound.

Mr. GORE. It was headed toward the airport, toward Rosslyn and then the airport. This building is 396 feet tall.

Mr. BURNETT. That is correct.

Mr. GORE. The airplane descended to 365 feet.

Mr. BURNETT. That is correct.

Mr. GORE. Which would put it around three or four stories below the top of that building.

Mr. BURNETT. That is correct.

Mr. GORE. And then began rising again and, according to an eye witness, flew directly over the top of the building.

Mr. BURNETT. Yes, and that may very well be true.

Mr. GORE. If it had not started rising again, is it not a reasonable assumption that it might very well have plowed right into the middle of that building?

Mr. BURNETT. Again, if it were laterally placed so that it eventually flew over the building, if it had not started rising, it would have hit the building; that is correct.

Mr. GORE. So, they averted a terrible disaster simply by luck, evidently. The pilot began to climb back up again. He was low enough to smack into the building but climbed back up again before he got to the building.

Mr. BURNETT. Well, I expect that it was by a whole lot of effort he averted it.

Mr. GORE. Yes.

Mr. BURNETT. Not merely by luck. But certainly, I think an extreme situation existed there.

Mr. GORE. But you have not interviewed the pilot yet.

Mr. BURNETT. No, we have not.

Mr. GORE. All right. Now, on that same day you went back and looked at the tape from the flight recorders of these other planes.

Mr. BURNETT. That is correct.

Mr. GORE. And you found that——

Mr. BURNETT. Excuse me. No, not from the flight recorders. We only had the flight recorder on the Eastern. The others, we learned of them. The Pan American had run through its 25 hours, I think, before we were able to get to it.

Mr. GORE. Yes.

Mr. BURNETT. And the others, we did not know about in time to pull them.

Mr. GORE. So, what data did you analyze?

Mr. BURNETT. We got the radar tapes that were recorded in the tower.

Mr. GORE. OK. Now, based on your analysis of that data, on the same day that this near collision took place, you found nine other flights that had descended into the danger zone over these buildings; is that correct?

Mr. BURNETT. We found nine other MSAW alerts. Now, I am not sure that we have established that all of them were right over this building. You would get an MSAW alert if you descended below 620.

Mr. GORE. I understand.

Mr. BURNETT. Which is still substantially above the building, and that MSAW alert extends on past that building.

Mr. GORE. But again, there were eyewitness accounts or earwitness accounts as well from people who complained about not just one but other flights going dangerously close to these buildings.

Mr. BURNETT. The reports we got were of two. I do not know whether others have said that there were more or not.

Mr. GORE. OK. Now, the FAA conducted an investigation of this and, according to your statement, and I am quoting here, "Everyone we spoke to at the FAA assured us there were no MSAW alerts during the period in question," MSAW being the minimum safe altitude warning.

Now, you went on to find after analyzing the data that there were nine separate MSAW alerts during a 60-minute period.

Mr. BURNETT. Well, we have to qualify that. We know that the radar signal which should have initiated the MSAW alert was recorded nine times.

Mr. GORE. Yes.

Mr. BURNETT. We do not know that the alerts actually sounded or were visually presented. There could be a problem in the system that some of those alerts may not actually be sounding. Now, whether that is possible or not, we do not know at this stage. We are too early in the investigation to resolve that.

Mr. GORE. Are you aware of any computer software problems that would have an impact on the MSAW system?

Mr. BURNETT. Following the incident on St. Valentine's Day and prior to March 8, some of the FAA people began to tell us that they felt there were problems with the software system. We have not established that that is true or that is in fact the problem.

We, as I indicated, may also have a human performance problem in that the warnings may be sounding but they may be tuned out, and we could have intentional ignoring of the warnings in the press of duties.

Mr. GORE. Well, now, why would not the controllers pass on the warning to the pilot?

Mr. BURNETT. Well, if they heard them, the warning sounds, if they realized the warnings were sounding, then possibly they may be making assumptions that this thing happened so much without any problem that it is something that is not really to be concerned about; or there may have been press of duties as far as the other demands on their time that caused them not to do so.

This is, however, a priority for their attention, equal to their maintaining separation between aircraft. So, I think we do have a very serious question here but we do not have the answer.

Mr. GORE. Now, let me ask you another question. Are there other cities in the United States where highrise buildings near the airport pose a hazard of a kind similar to this for landing airplanes?

Mr. BURNETT. Well, I think there certainly are, but I think the distinction here is, we have had a nonprecision approach at Washington National.

Mr. GORE. Yes.

Mr. BURNETT. The NTSB has objected to that for a long time. Mr. Kelly, do you have any comments?

Mr. KELLY. Well, to answer your question, I do not believe that we know of an airport in the United States that has a high building in the approach path that is not served by a precision approach.

At National, back from the Piedmont incident, that has been our objective, to get a precision approach to the landing on runway 18.

Mr. GORE. What about Miami and San Diego?

Mr. KELLY. Well, I believe they have precision approaches, which gives the pilot vertical guidance.

Mr. GORE. I see. And that is what you have been trying to get the FAA to do.

Mr. BURNETT. Yes.

Mr. GORE. Are you satisfied with their response?

Mr. BURNETT. With what they now have determined to do and with the, I think, emphasis that they are now giving it, yes, we are. Neither of us at this point knows what we need to do about the MSAW.

On the approach issues, I think that we have reached agreement and they not only agree but are moving as fast as they can to correct the problem.

One concern I still have: I am not sure what position they have taken on the need for special enforcement. I am not convinced that merely the 720 visual descent point is going to necessarily work



unless every one knows that there is a danger of some enforcement action if it is violated.

Mr. GORE. Why does it take so long for the FAA to respond to sensible concerns such as those expressed by the Transportation Safety Board in this instance?

This is not the only time where the Safety Board has analyzed an accident or a near accident and made recommendations to the FAA, and they have just dragged their feet and gone at a snail's pace, and refused to implement the safety recommendations.

Why do you think they have that problem?

Mr. BURNETT. Well, in the beginning and somewhat in their defense, I will say that they do need a reasonable amount of time to analyze what we give them.

Mr. GORE. But you do not disagree with the premise of my question, do you?

Mr. BURNETT. That there has been foot-dragging on the part of the FAA?

Mr. GORE. Yes.

Mr. BURNETT. No.

Mr. GORE. Well, why do you think there has been such foot-dragging on an institutional basis by the FAA?

Mr. BURNETT. It depends on the individual situation. In this case, I suspect that it was partly because they said this thing had not happened, and then we established it happened. I imagine there was some resentment of it.

Mr. GORE. But what I am getting at, Mr. Burnett, is that this seems to happen over, and over, and over again with the FAA. They do not listen when the Transportation Safety Board tells them about imminent hazards. Now, you know that to be the case, do you not?

Mr. BURNETT. Well, we know that there are several cases. We are quite proud of the receptivity of the FAA to our recommendations in comparison with what we get from other agencies that we make recommendations to.

Certainly, I think if we were in a situation where the FAA and the NTSB agreed all the time, the public would have to suspect whether either one of us were doing our job because we have a watchdog function over them and it would not be natural that we would agree all the time.

Mr. GORE. Let me just follow this up briefly and then I will yield.

You are being a lot more diplomatic than I am trying to get you to be here, and I think more than your instincts tell you to be. It may be that you want to counterbalance the tone of the question.

But the simple fact of the matter is that this is a recurring problem in the relationship between NTSB and the FAA. You all make recommendations and they seem to drag their feet and take forever to implement them.

I am wondering, I am trying to get a little guidance from you on what the nature of that problem is. I suspect that it may go back to the conflict in the charter given to the FAA to promote the airlines and, at the same time, to regulate the airlines. That may be what is causing them a problem.

Do you agree or disagree with that?

Mr. BURNETT. I think, Congressman, first I am trying to be diplomatic. I recognize the problem that you are citing. Part of it is because of the institutional friction that has to develop between a watchdog agency and one that is subject to that oversight.

You know, I do not want to add to the problem by calling people names. So, I am trying to avoid doing that or contributing to that. You know, the NTSB has some responsibility for the nature of our relationship with the FAA as well as the FAA. One of the things I have tried to do is, while being very vigilant and pressing the FAA for the things that we want, to try to do it in a way that will meet with as little offense as possible so we can set up a relationship.

However, moving on to the point about the FAA's being responsible for promoting aviation as well as promoting safety, I do not agree with the position that is so often taken by some Members of Congress that the fact that the FAA is charged with promoting safety and promoting aviation is an institutionally bad proposition.

The NTSB does have our emphasis on safety. That does not mean that we do not use commonsense in evaluating the impact of the recommendations that we make.

However, I think somewhere along the line in Government, someone has to resolve the conflicts that develop between safety and efficiency, safety and economics, and safety and the continued existence of an industry.

I would much prefer for those conflicts to be resolved within the FAA than for them to have to be resolved in the White House or someplace else. Ultimately, those things have to be resolved, there has to be a balancing.

So, I do not think that we are going to accomplish very much by saying to the FAA, "You are no longer responsible for promoting aviation safety, or aviation, you are just responsible for promoting safety" because, first, you cannot promote aviation without promoting safety. The public's confidence in the safety of aviation is essential to its economic well-being.

Second, you take an example of the air traffic control system. The FAA is engaged in that for two reasons. One is to provide for the safety of the public, the flying public, and people on the ground. Also it is to expedite the takeoff and landing of aircraft. You cannot separate those functions and I do not think it is desirable to try.

Mr. GORE. Let me yield to Mr. Carney.

Mr. CARNEY. Along the chairman's questions, Jim, I do not mean to throw a hand grenade to you, but why do you think your solutions are better than the FAA's solutions?

Mr. BURNETT. They are not, necessarily.

Mr. CARNEY. So, do you not think they should have some time to analyze the solutions that you come up with?

Mr. BURNETT. I definitely do, and I think when we make recommendations to them, quite frequently the FAA will come back and say, "For these reasons, we cannot do what you have asked us to do. But we recognize the problem and we can do this."

We will find their substitute solutions to be sometimes adequate.

Mr. CARNEY. One of the solutions that you recommended, you yourself have pulled back saying that at this point, you are not sure if that is the right place to put it; right?

Mr. BURNETT. Yes.

Mr. CARNEY. I do not want anybody to set you in a position of being infallible.

Mr. GORE. If I may reclaim my time at this point, I do not think that is the situation at all. What we have here is a situation where the FAA was told about a problem by the NTSB and then denied there was a problem. They came back and said they did not think there was a problem before this March 8 episode took place. They said, "Everything is OK; no problem."

After the warning, then this airliner comes in, headed smack-dab for the USA Today Building, three or four stories down from the top and only at the last minute pulled back up and went right over the top of the building.

So, it seems to me that the position of the Transportation Safety Board has been borne out and the position of the FAA to the effect that there was no problem turns out to look pretty ridiculous.

Mr. CARNEY. Well, if their procedures had been followed, this would not have happened in the first place. So, how can you blame the FAA?

The FAA did not tell the plane to be there. The FAA clearly set up procedures to make sure the plane was not there, and so has the NTSB. I do not see why we are whipping on the FAA.

Mr. GORE. Well, reclaiming my time once more and then I am going to recognize Congressman Boehlert, what the NTSB identified—if I understand it correctly and you correct me if I am wrong, Chairman Burnett—is a systems problem where you have not only high buildings but an approach that relies upon the pilot's judgment instead of having a precision-guided approach. You looked at that situation and said, "Look, this is the situation that is bound to cause trouble if it continues and when you combine it with the eyewitness reports and the records of this incident that occurred previously, this is cause for concern, we ought to do something about it."

The FAA, in response to that, said, "No, no problem, nothing to worry about. We will just leave it alone and do nothing."

Now, that is where the situation stood prior to the March 8 incident, as I understand it.

But let me recognize Congressman Boehlert at this time.

Mr. BOEHLERT. Thank you, Mr. Chairman.

Mr. Burnett, is there a need for some sort of binding arbitration here some place because, as I look over the chronology on that Piedmont incident of December 28, 1982, you really, the NTSB, released on March 24, 1983, your report on the incident and you made several recommendations

Then the FAA—and it would appear to be a timely evaluation—subsequently rejected those recommendations. Then, what happened? You have one position, the FAA has another position, and nothing happened until we had the March 8 incident, really.

Mr. BURNETT. Now, I would say, Congressman, that something did happen because the FAA changed its position in December 1983. They did that because, perhaps, of some binding arbitration that took place in the Office of the Secretary.

The NTSB has never sought—and I think it would be a bad idea for us to have—a direct role in the regulatory process because if we did, we would no longer be what we are, which is an independent

investigating agency. In other words, we would then be investigating what we have done or not done. That would tend to move us toward the FAA's perspective and position, and we would not have the, I think, healthy tension between the two institutions.

I think our job in many cases is to set the agenda. We move an issue up, we try to keep it front and center, and then the public policymakers, which include the regulators at the FAA and the members of this committee and other committees of the Congress, and the public and the press, have an opportunity to bring their views to bear on the decision that the FAA makes.

Mr. BOEHLERT. So, you do feel there is a procedure for arbitration, if you will.

Mr. BURNETT. Yes. Unfortunately, some of the issues that we cite are not as visible as this one. Some of them happen at airports that do not get the attention that Washington National gets. Some of them are even more technically difficult than this issue. So, we do not give it the same kind of attention.

But the NTSB certainly seeks to pursue the issues that we raise with the FAA.

I might also say, when we made these recommendations, we did not expect that the FAA was going to adopt all of them. We did expect that they would adopt some of them in some form and that some of them in some form would probably be sufficient to keep this from happening again.

What we got was none of them in any form initially, and then, after we then went back to them, rated their response unacceptable, it got a great deal of public attention which, of course, we were very pleased to foster. The Secretary of Transportation became interested, as well as this committee and others. We got a different response from them.

Mr. BOEHLERT. I think Mr. Carney makes a good point that NTSB is not always right and FAA is not always wrong. Do you feel that you have a relationship where you really sit down and talk this thing over, a "Come let us reason together" type of thing?

Mr. BURNETT. I think basically our relationship is a constructive relationship. That does not mean that it is without problems. Certainly, I have tried to keep pressure on the FAA. When you try to keep pressure on someone about some issue, you are going to build some friction there.

But at the same time, we have tried to be diplomatic in how we have handled the situation, and we certainly realize that we are not always right. But it is our duty, sometimes even when we are unsure of an issue, if it affects life and death you have to bring it out on the table and let everybody take a look at it.

That is what the NTSB does. When the FAA shows us, as they often do, that there is another way, a better way, of doing something, we are quick to accept it.

Mr. BOEHLERT. Well, we have learned today that on March 8 there were not just 2 incidents but perhaps as many as 9, or is it 11? Is it nine plus the two, or the two are included?

Mr. BURNETT. I think the two were included in the nine.

Mr. BOEHLERT. Now, is there any investigation underway on the other seven?



Mr. BURNETT. I do not know that we could even identify the aircraft that were involved in the others. Mr. Ferguson, you might know.

Mr. FERGUSON. Yes, we have identified probably all of them and this is something we are still in the middle of the investigation of. The investigation is ongoing right up to the time of the hearing.

Mr. BOEHLERT. So, you are looking at the other seven, also.

Mr. FERGUSON. Yes, we are.

Mr. BURNETT. I do not want to commit us. I do not see that there is going to be a great deal for the Board to accomplish by pursuing all of these and trying to find out how close all of them came to the building and why they did it.

It may be something that the FAA needs to pursue for enforcement purposes. I think our manpower right now needs to be focused on the MSAW system, what is wrong with it; how widespread is it because I think that is where we can really accomplish something.

I think there is a chance that we will beat a dead horse. I think the fact that what happened with Piedmont was not an isolated issue has been proven, it is established, everybody agrees with it. It would be a waste of our manpower to chase after something that has really been accomplished.

Mr. BOEHLERT. I would agree, but it is important, I think, to focus attention on the magnitude of the problem. It is not just an occasional isolated incident. There have been many and then, just 1 day alone, nine at least.

I want to thank you very much for your statement.

Mr. BURNETT. Thank you.

Mr. BOEHLERT. No further questions, Mr. Chairman.

Mr. GORE. Congressman Wolf, we are pleased to welcome you to our proceeding today.

Mr. WOLF. Thank you very much.

I appreciate the committee giving me this opportunity, I am not on the committee. Just to make a couple of comments: I want to commend you, Mr. Burnett. I know when you originally were appointed someone once said that you did not have that much experience in aviation. But I want to tell you, you have done an outstanding job and, I think, a lot of the credit on the FAA responding after you got involved really should be given also to Mrs. Dole.

I know we had continually prodded, and pushed, and cajoled. But only when Mrs. Dole got directly involved did action begin to happen quickly.

Second, I think, with the new FAA Administrator who, I believe, is leaving the NTSB, is that not correct?

Mr. BURNETT. Yes. I would not want to speak for the President or for the Senate, which still has to confirm that nomination. But we are very excited about the prospect of having someone who understands how the NTSB works at the helm of the FAA.

Mr. WOLF. I think that is going to make a tremendous difference and maybe bring an opportunity together.

Mr. BURNETT. I do not think we want to oversell that. I think there will continue to be, properly, institutional differences between the FAA and the NTSB. We do not want for anybody to think that there is going to be any collusion there. We are still

going to be at an arm's-length relationship. It is not going to solve all the problems. But I think certainly, to have an administrator who understands the competence of the NTSB as well as our limitations, I think, will be a big plus.

Mr. WOLF. It cannot hurt.

Two very quick questions. One, how are the pilots being notified of the changes? I know there is an advisory circular that goes up. But will the individual pilots that fly into National be notified, or will it just go into the manual?

Mr. BURNETT. I am not sure that I can answer that. I am certainly hopeful that individual airlines—and I know there are representatives of the airlines here today—are going to be attentive to it.

I know that the Airline Pilots Association is going to be testifying and I certainly believe they are going to be anxious to keep their membership out of trouble.

I think there might be some more, even, organized way of doing it, but I am not sure that I can speak to that issue right now.

Mr. FERGUSON. The ATIS, that is a terminal information system, does mention that the altitude will be maintained until the VDP is arrived at. So, that is another alerting. And then, of course, it is on the approach way.

Mr. WOLF. Well, can there be any way of notifying especially the pilots who on a continuing basis fly in and out of National?

Mr. KELLY. Congressman Wolf, it is our understanding that the FAA has already sent information to their principal operation inspectors serving each airline that flies into National Airport, to specifically inform the pilots of those airlines of the implementation of the new VDP and also to inform the pilots that the approach will be radar monitored and if there are any violations, enforcement action will be considered.

Mr. WOLF. OK. One last question. Is there anything else that can be done? Is the FAA now agreeable to doing everything, or is there anything else that you think could be done?

Mr. BURNETT. Other than with the MSAW system, we do not know what should be done right now. I think they are doing everything that we have identified they should be doing.

The NTSB will continue to follow up with them to be sure that this is carried out. We have made recommendations to the FAA in the past. It was indicated that they were going to be done and then not followed through, although I do not have any doubts now in my mind that this is in fact going to be done. I think we have everyone on board.

Mr. WOLF. Thank you very much.

Mr. GORE. Thank you.

Mr. Burnett, we have kept you from an appointment over on the Senate side. I would like to ask you to respond to additional questions in writing if that is all right.

I have one question I am particularly interested in, the results of the FAR 139 study at 14 airports which you made reference to in our last hearing.

I am particularly interested in the enforcement record that you



found because you expressed some concern about enforcement followthrough in this particular matter.

If you could respond to that and some other questions in writing, we would appreciate that.

[The requested information follows:]



## National Transportation Safety Board

Washington D.C. 20594

### Safety Information

FOR IMMEDIATE RELEASE: April 17, 1984

SB 84-14/3625B

The National Transportation Safety Board, after a safety study of 14 airports across the United States, today issued 21 recommendations for improved safety regulation by the Federal Aviation Administration of all 662 regulated airports.

While finding that safety at such airports has improved since FAA began its airport certification and surveillance in 1972, the Safety Board called for:

- Careful safety assessments by FAA before any crash-fire-rescue requirements are eased at any of the smaller airports that are served by airlines.
- New regulation of the safety of airport fuel farms and refueling facilities, including certification of personnel, new design and construction guidelines, and detailed inspection procedures.
- Rewriting parts of FAA's airport certification handbook, and more frequent reassignment of its airport safety inspectors to promote regulatory uniformity wherever possible.
- Mandatory airport emergency drills that would be held at least once every four years at each certificated airport.

The Safety Board's study addressed airports in general. It made no specific conclusions or recommendations on safety at any one of the airports, which included Washington National and Dulles International in the District of Columbia and Virginia; J. F. Kennedy International and LaGuardia in New York; Los Angeles International, San Diego-Lindbergh and Burbank-Glendale-Pasadena in California; Houston Intercontinental and Houston-Hobby in Texas; Chicago-O'Hare and Chicago-Midway in Illinois; Denver-Stapleton in Colorado; Boston-Logan in Massachusetts and Ft. Lauderdale-Hollywood in Florida.

The Safety Board found "a measurable improvement in airport safety" since FAA airport regulation began with inauguration of its airport certification program in 1972. In addition to airport safety regulation, the Board attributed this to safer aircraft, better pilot training, additional navigation aids, and improved weather service and air traffic control.

The Safety Board said an impending notice of proposed rulemaking, suggesting reduced crash-fire-rescue requirements at Class A and B airports — the smaller airline-served fields — could result in "little or no" CFR protection at these airports even for airliners such as the Boeing 767 and 757. Any proposed rulemaking should be accompanied by lists of affected airports, types and schedules of airliners serving them, "and a description of the effect...on firefighting posture," the Board said.

More

FAA's minimum requirements for water and other extinguishing agent capabilities are "far" exceeded by guidelines of the National Fire Protection Association and the International Civil Aviation Organization, the Board study showed. Although "nearly all study airports voluntarily met" those higher standards, the Safety Board urged FAA to raise its minimums.

The Board reported that FAA has the legal authority to regulate training and proficiency of refueling personnel at airports, but does not do so. There also is no standardized program for training of FAA inspectors on fuel dispensing and storage. Older fuel storage safety and warning devices often are not accurate or reliable.

The Board also pointed out that construction on airports and in surrounding areas has eliminated or reduced original distances between fuel farms and commercial or residential developments.

Safety areas paralleling airport runways were found by the Board study to be adequate at airports of all sizes. At airports in highly developed areas, the Board reported, "safety areas at the ends of runways were marginal or non-existent" as measured by FAA airport design guidelines.

"It is unlikely that safety area dimensions could be increased at the ends of runways at smaller airports surrounded by commercial development," the Safety Board said. Where airport expansion is restricted, for whatever reason, a "soft-ground" concept has been developed that uses gravel or crushed stone on a sloping surface to slow down over-running aircraft. This may be "an economical means of safely improving stopping capability," the Board said.

The airport study also reiterated the Board's long-standing position that FAA should require runway distance markers at all airline airports. The Board has maintained since 1972 that such markers would be helpful to pilots as simple, effective measurements of remaining runway during both takeoffs and landings.

The Safety Board's complete printed report will be available in approximately one month. Copies of this report, which should be identified as PB-82-910415, may be purchased by mail from the National Technical Information Service, 5285 Port Royal Road, Springfield, Virginia 22161.

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# NATIONAL TRANSPORTATION SAFETY BOARD

## WASHINGTON, D.C.

ISSUED: April 16, 1984

Forwarded to:

Honorable Donald D. Engen  
Administrator  
Federal Aviation Administration  
Washington, D.C. 20591

SAFETY RECOMMENDATION(S)

A-84-21 through -41

In 1982, accidents near Washington National Airport, 1/ at Boston Logan Airport, 2/ and near New Orleans International Airport 3/ tragically involved many long-standing concerns for the safety of aircraft operations in the airport environment. In response to the significant safety issues raised by the Washington and Boston accidents, the Safety Board conducted a special investigation 4/ to explore the problems of large airplane operations on contaminated 5/ runways. This special investigation focused on information about runway conditions and their relationship to airplane performance, as well as problems in communicating such information among the various elements of the air transportation system.

The Safety Board has completed a safety study of airport certification and operations 6/ to examine in depth two of the three major elements of airport safety--maintenance and operation of airport facilities and airport physical features. The third major element, aircraft operation, is addressed only briefly in this study, because it is an extensive topic which involves several complex facets such as design and performance of aircraft, development and application of operational procedures, reliability and availability of navigational aids, and the accuracy and timeliness of communicating important information in the airport environment. The safety study

1/ Aircraft Accident Report--"Air Florida, Inc., Boeing 737-222, N62AF, Collision with 14th Street Bridge, near Washington National Airport, Washington, D.C., January 13, 1982" (NTSB-AAR-82-8).

2/ Aircraft Accident Report--"World Airways, Inc., Flight 30H, McDonnell Douglas DC-10-30, Boston Logan International Airport, Boston, Massachusetts, January 23, 1982" (NTSB-AAR-82-15).

3/ Aircraft Accident Report--"Pan American World Airways, Inc., Clipper 759, Boeing 727-235, N4737, New Orleans International Airport, Kenner, Louisiana, July 9, 1982" (NTSB-AAR-83-2).

4/ Special Investigation Report--"Large Airplane Operation on Contaminated Runways" (NTSB-SIR-83-2).

5/ "Contaminated" as used in the referenced report and in this report means that ice, snow, slush, water, or rubber deposits have accumulated on the runway to the extent that airplane performance is affected measurably.

6/ For more detailed information read, Safety Study--"Airport Certification and Operations" (NTSB/SS-84/02).

3625B

examines the background and scope of 14 CFR Part 139 as it concerns the maintenance and operation of airport facilities; the Federal Aviation Administration's (FAA) administration of the airport certification program; the results of certification activities; airport physical limitations; and other related safety considerations.

Selected for the study were airports that would permit comparison of airport certification and surveillance methods employed by different FAA regional offices as well as observation of operations at some physically limited older facilities and some less constrained newer airports located in the same geographical area. Parameters considered included passenger enplanements, runway length, safety area characteristics, dates of construction or modification, accident and incident histories, and approach area characteristics. All but one of the airports chosen were selected from among the 36 large hub airports for 1981, which handle a large number of total aircraft departures, serve the largest volume of revenue passengers, and are located in geographical areas served by more than one certificated airport. After weighing these considerations, obtaining the viewpoints of representatives of the Air Line Pilots Association, the Airport Operators Council International, and the American Association of Airport Executives, a group of 14 airports in 7 different FAA regions was chosen, including 5 airport pairs. The airports chosen for study were: Washington National, Dulles International, Kennedy International, New York LaGuardia, Los Angeles International, Burbank-Glendale-Pasadena, Houston Intercontinental, Houston Hobby, Chicago O'Hare, Chicago Midway, San Diego Lindbergh, Denver Stapleton, Boston Logan, and Ft. Lauderdale-Hollywood, Florida.

The principal process used by the FAA to implement the airport certification program is the facility inspection. Airport inspections are the basis for determining if an airport's facilities, maintenance, and operations meet the regulatory requirements of Part 139. FAA Order 5280.5 contains policy guidance and standard procedures for FAA personnel to conduct the certification program.

The Safety Board's facility checks confirmed the accuracy of FAA inspection findings for pavement area conditions and marking and lighting runways, thresholds, and taxiways at all but one of the study airports. Also, FAA inspection records regarding protection of navigational aids, bird hazard reduction, construction area marking, and snow removal were found to be accurate, and no serious deficiencies were noted in these areas. Although the Board found that the airports had several different methods of satisfying these requirements, each seemed to be appropriate for the local conditions, and responsible personnel were very knowledgeable about the effectiveness of procedures. However, the Board also found that vagueness of certain FAA compliance criteria and regional disagreement on their application has resulted in some airports having far better methods than others for control of ground vehicle operations, public protection and animal control, fuel dispensing and storage, and runway surface condition assessment.

No unsatisfactory trends in ground vehicle operations were reported in recent FAA inspections of the study airports, but the Safety Board's survey found distinct differences in the degree of airport management control over ground vehicle operations and conditions at the various airports. Some airports required annual inspections of all vehicles driven in the aircraft parking area, and some airports maintained strict driver standards through the suspension of airport operations area driving privileges in cases of poor performance. At airports where there was less vigorous control of ground vehicle operations, the Board found more recorded vehicle and aircraft collisions for the prior year than at the other airports.

FAA annual inspections of public protection measures at the study airports usually cited problems such as open gates or doors leading to the airport operations area and occasionally identified situations where the airport operations area could be entered by climbing over articles stored near a fence. The Safety Board found some uncertainty among certification inspectors about what an airport should do to insure public protection. Some of the confusion results from ambiguities in the FAA regulations. Title 14 CFR 139.65, which requires a certificated airport to have "... appropriate safeguards against inadvertent entry of persons or large domestic animals onto any airport operations area," also states that airports complying with 14 CFR Part 107--Airport Security are acceptable under 14 CFR Part 139. But Part 107, which is intended to provide protection against acts of criminal violence and air piracy, requires airport operations area security to prevent "... entry of unauthorized persons and ground vehicles." Apparently, inspectors are not sure whether airport public protection measures should be required to prevent "inadvertent entry" to the airport operations area (14 CFR 139.65) or "... to control penetration of an [airport operations area] by an unauthorized person" (14 CFR 107.23). Also, 14 CFR 139.65 specifically requires safeguards against inadvertent entry of "large domestic animals" to the airport operations area; however there is no requirement to prevent entry of wild animals, nor is there any definition of a "large domestic animal."

At all study airports except Dulles International and Burbank-Glendale-Pasadena, the Safety Board saw fueling service discrepancies which included leaking fuel trucks, fuel trucks without fire extinguishers, trucks on which the fuel type was not easily identified, fueling being performed without grounding, and fueling being performed without securing (chocking) the wheels of the truck. A review of FAA annual inspection records for these airports did not show any similar observations by FAA inspectors. Records at one regional office indicated that inspectors were uncertain about what bonding and grounding procedures should be considered acceptable during fueling operations.

Extensive comments on prior inspection reports about fuel handling and storage were found at only one of the regional offices surveyed. While fuel storage inspection is an annual requirement, the Safety Board found that many of the FAA certification inspectors have no experience or formal training in the operation of fuel storage facilities, nor do they have standard guidelines to use during the inspection process. The Board found this apparent lack of surveillance capability to be disturbing.

The Safety Board also found that a fundamental disagreement existed between airport operators and the FAA regarding an airport's responsibilities under 14 CFR 139.51(b) which requires that "the airport (or its tenant) as the fueling agent have an adequate number of trained personnel and procedures to safely dispense aviation fuel." Airport managers said that holding the certificated airport responsible for tenant fueling agent operations is unfair and that adequate surveillance of fueling operations would impose a severe financial burden on the airport. The airport managers further argued that they are not held responsible for the quality of airplane maintenance or flight training of their fixed base operations (FBO) or for certifying those individuals conducting such services and that they did not understand why one segment of an FBO's services (fueling) was being singled out. Many airport managers believed that fuelers should be licensed by the FAA as are pilots and mechanics. Since the responsibility for aviation safety is shared by pilots, mechanics, and fuelers, the FAA should ensure that a minimum level of competency for fuelers is required by instituting a certification program.

The Safety Board's concern that the FAA's inspection personnel had too limited knowledge of storage facilities led to study team visits of 30 fuel service facilities for the purpose of identifying problems. Only two of the facilities visited administered a prehire



test for aptitude. About 75 percent of the fuel service facilities hired people "off the street" for refueling positions. The remaining facilities elevated personnel to a refueling position from within company ranks. Roughly 90 percent of the facilities that hired people "off the street" preferred that the prospective employee have some aviation and/or fueling experience; however, this was not mandatory.

Each facility required a new employee to read company safety, operations, and quality control manuals and attest to having done so by signing a statement. This was the only classroom or self-study training for new refueling employees at 20 percent of the fuel service facilities visited. The remaining 80 percent had tests on refueling procedures and some audiovisual presentations. Managers of all of the facilities visited said that they reviewed the use of fire extinguishers with new hires as part of the employee's training. However, only five facilities provided new hires with the "hands on" practical use of a fire extinguisher. Only four facilities had some type of recurrent training for refueling personnel, which varied from an oral question-and-answer period to an observation and critique of the refueler's performance.

Managers of all of the fuel service facilities visited said that they reviewed safe airport driving practices with new hires. However, only two of the facilities required the employee to pass a drivers test; one of these facilities was located on an airport that required new airport employees to pass a driving test administered by airport authorities.

The majority of the fuel service facilities used old refueling vehicles--in some cases nearly 20 years old--but most of the vehicles appeared to be in good mechanical condition. Managers said that vehicle maintenance was good. All of the facilities required a condition inspection of their refueling vehicles, and nearly every facility required that the vehicle inspection be performed with a company inspection checklist tailored to the refueling vehicles. However, only one facility published a minimum requirement checklist which provided specific guidelines to be used in deciding whether to accept or reject a vehicle.

Most of the fuel storage facilities at the 14 study airports were old--in some cases over 40 years old--and settling of storage tanks over long periods has resulted in leakage into the ground at some facilities. While not considered a fire or explosion hazard, leakage into the ground is a serious environmental concern. When these facilities were built, they were located in remote sections of the airport. Through the years, both on- and off-airport construction has caused the distance buffer between the storage facilities and highly traversed areas to be diminished greatly. Washington National, Houston Hobby, and Fort Lauderdale-Hollywood are prime examples of this encroachment. Heavily used public roadways lie just a few feet away from the fuel storage facilities on these airports.

Every fuel storage facility had experienced a fuel spill. In some cases the spill amounted to several thousand gallons. Most of these larger spills were caused either by defective valves or fittings or by the failure of overflow warning devices to alert fueling personnel. About 50 percent of the facilities periodically checked their overfill warning systems. However, nearly all of the fuel service facility managers interviewed indicated that mechanical sensing systems were not very accurate or reliable, and checking the operation of these mechanical systems was difficult or in some cases impossible. For example, one facility the Safety Board visited had a high-level alarm system which was not equipped with a means to check its operation. Fuel spills have occurred at this facility because the mechanical sensing system failed to activate and thus alert personnel to halt the fueling operation. At another facility the mechanical high-level overfill sensor failed its last alarm test.

The airport certification regulations require that firefighting and rescue services be available at certificated airports in accordance with index standards established in Part 139. Although these services will not prevent accidents, they may significantly increase the survivability of certain types of crashes which occur within reach of the emergency equipment. In the postcertification period (1973 through 1981), 53 percent of the air carrier accidents occurred on the airport, and 18 percent of those involved a fire. While the number of air carrier accidents occurring on airports decreased 50 percent in the postcertification period, the 138 postcertification, on-airport air carrier accidents indicated a continuing need for emergency services at airports.

The Safety Board's review of FAA annual inspections of crash-fire-rescue equipment and services and emergency plans for the study airports showed that all airports complied with the requirements of Part 139. The onsite survey of emergency capabilities showed a wide variation in the equipment, resources, and procedures found at the study airports.

Chicago Midway met the minimum requirements; all other study airports exceeded the minimum vehicle requirements of the regulation. The average number of vehicles at airports having no structural firefighting responsibility was 5.6, which exceeded minimum requirements by 87 percent. The minimum staffing requirements of 14 CFR 139.49(h) call for: "...sufficiently qualified personnel to insure at least 85 percent of the required maximum agent discharge rate of firefighting equipment." Since most firefighting equipment has a turret system which enables the operator to meet the 85 percent discharge requirements, it is theoretically possible that the regulatory requirement could be met with as few as three people--one person who could drive the vehicle and then operate the turret system for each of the three vehicles. However, the staffing of crash-fire-rescue services at all study airports exceeded this theoretical minimum.

Part 139 specifies minimum water quantity requirements for firefighting. The National Fire Protection Association (NFPA) and the International Civil Aviation Organization (ICAO), of which the United States is a member, have published guidelines for water and dry chemical agent quantity similar to those of Part 139. ICAO and NFPA quantity recommendations exceed the Part 139 minimum requirements. Beyond the minimal requirements prescribed by Part 139, the FAA, in Advisory Circular (AC) 150/5210-6B--Aircraft Fire and Rescue Facilities and Extinguishing Agents, dated January 26, 1973, has described recommended levels of protection which are comparable to ICAO standards. The study airports not only exceeded FAA minimum standards for water quantity, they all exceeded the more demanding NFPA guidelines and ICAO member requirements. If the degree to which study airports voluntarily exceeded the minimum requirements for manpower, equipment, and extinguishing agents of Part 139 is typical, then the adequacy of the minimum levels established by the FAA appear to be questionable, especially since the FAA advisory publication recommends higher levels based on research, test data, and experience.

Title 14 CFR 139.49(i) requires that crash-fire-rescue personnel be "...familiar with the operation of the firefighting and rescue equipment and understand the basic principles of firefighting and rescue techniques." The FAA's AC 139.49-1, AC 150/5210-12, and AC 150/5280-1 list several topics for crash-fire-rescue personnel training. However, these AC's are only advisory, and they are subject to interpretation. Most of the study airports had conducted emergency drills; some alternated full-scale drills with table-top simulation exercises on an "every-other-year" basis. Only table-top simulations were conducted at a few airports because managers were concerned that full-scale drills caused local traffic congestion and, in their opinion, wasted manpower.

The Safety Board believes that full-scale exercises of emergency plans usually reveal problems which would not be apparent in a table-top demonstration. The Board found that, in general, FAA inspectors were encouraging the study airports to conduct live drills and full-scale emergency exercises. The weakest area of training the Safety Board observed was in familiarization with new airplanes. None of the crash-fire-rescue units at the study airports had training diagrams of the DC-9-80, or the Boeing 757 or 767.

Title 14 CFR 139.49(h) requires that firefighting and rescue personnel be "appropriately clothed." Although the FAA highly recommends the proximity suit for aircraft firefighting, there is nothing in Part 139 or FAA Order 5280.5 to preclude the use of less effective protective clothing to comply with 14 CFR 139.49(h). All of the protective clothing observed at the study airports was the aluminized fabric type, although many of the suits differed in construction and in fabric weight. There were no standards available to inspectors for judging the adequacy of various types of proximity suits.

The FAA convened a public meeting on July 14, 1983, to discuss updating and amending Part 139, in light of its experience with the certification program, as well as Safety Board and industry recommendations, and the results of its own studies. The subjects proposed for discussion by the FAA included emergency plans, snow removal, safety areas, bird hazard management, fueling operations, marking and lighting of runways and taxiways, crash-fire-rescue index requirements, and crash-fire-rescue training. The FAA also has proposed specific standards for training requirements such as those recommended by the NFPA, which should eliminate some of the variations in crash-fire-rescue training observed at the study airports. The State of Georgia has enacted legislation to require firefighters to successfully complete training in accordance with NFPA Standards 1001 and 1003. These standards specify a method to evaluate a training curriculum for crash-fire-rescue personnel. The Georgia program is viewed by some as a prototype which could be used as a model for other programs. However, an FAA official observed that it is impractical and inequitable to impose "across the board" training requirements on both large and small airports. Although some differences in the training syllabus for crash-fire-rescue personnel would seem to be appropriate at larger (index C, D, and E) and smaller (index A and B) airports, the Safety Board believes that 14 CFR Part 139 must specify a minimum acceptable level of training for all certificated airports. Crash-fire-rescue personnel should be equally well prepared at all airports to handle aircraft emergencies.

The most controversial proposal introduced by the FAA at the public meeting called for lowering crash-fire-rescue vehicle requirements at index B airports from two vehicles to one, and substituting an unspecified level of crash-fire-rescue protection, which would be established in individual negotiations between the FAA and airports, for the present index A minimum requirements of one vehicle with a 3-minute response time. This proposal emanated from an FAA-commissioned study <sup>7/</sup> of crash-fire-rescue costs and benefits, which recommended eliminating crash-fire-rescue requirements at lower index airports because of low benefits accrued in proportion to costs. The FAA has received comments from organizations such as the NFPA and the Air Line Pilots Association (ALPA) critical of the study methods and findings. The Safety Board is concerned that this proposal could lead to a safety reduction at lower indexed airports, which account for more than half of all the certificated airports and enplane about 3 percent of all passengers each year. Theoretically, under existing regulations and the proposal advanced

<sup>7/</sup> "Airport Crash, Fire, and Rescue: Policy Alternatives Suitable for Further Analysis," H. H. Aerospace Design Co., May 1982, DOT/FAA/AS/82-1.

for discussion, large jet transport aircraft could average four departures per day at A or B airports and be virtually unprotected by crash-fire-rescue equipment. The Board views with concern any reduction in crash-fire-rescue capability and intends to carefully review any proposed rule change in this regard at such time as a Notice of Proposed Rulemaking (NPRM) to amend Part 139 is issued.

As the Safety Board staff visits to the seven FAA regional offices and the 14 study airports within the regions progressed, the Board was able to construct a qualitative and quantitative picture of the methods used to administer certification program activities. Interregional annual inspection differences and differences between FAA annual inspection records and the Board's observations already have been documented. In cases where regulations were found to be vague or guidance materials highly subjective, the differences were readily discernible. However, the Board found also that other qualitative factors such as the inspector's professional background and distinct styles of management appeared to influence regional surveillance activities.

The operation and maintenance of the study airports required the attention of personnel with diverse backgrounds and experience in areas such as civil engineering, electrical engineering, firefighting and rescue, public protection and emergency planning, and aircraft operational requirements. Most FAA certification inspectors, in the seven regions visited, had in-depth experience in one of the engineering disciplines, and many were also pilots. The inspectors had to augment their professional qualifications and experience in unfamiliar areas through agency training and on-the-job experience. In each of the regions, the Board observed in annual inspection records of study airports that inspectors naturally tended to emphasize the areas corresponding to their background and experience. To overcome this tendency, five regions recently established a form of inspection assignment rotation among inspectors.

Some regional offices appeared to have developed a degree of expertise in certain aspects of airport operations which was acknowledged by other regions surveyed. For example, fuel storage and dispensing expertise was found in one region, crash-fire-rescue expertise in another, and bird hazard reduction expertise in yet another. Regional managers and inspectors believed that the expertise evolved either from the need to deal with a particular problem related to local conditions or geography common to many airports within a region, or from individual inspector expertise or interest in an area such as crash-fire-rescue.

Many of the region-to-region differences in the administration of the airport certification program, for which justification is not readily apparent, could be reconciled through an organizational unit with the authority to resolve conflicting viewpoints. An organizational entity for airport certification, patterned after existing FAA Aircraft Certification Directorates, could draw upon regionally dispersed technical expertise to provide the best advice for development and implementation of uniform, detailed regulatory compliance criteria.

The tragic consequences of the Air Florida accident near Washington National, the World Airways accident at Boston, and the Pan American accident at Kenner, Louisiana, brought forth renewed expressions of concern for the safety of people residing, working, or traveling near airports, as well as for the safety of air travelers. The adequacy of airport safety margins has been questioned, especially at older, smaller airports originally designed and built to serve airplanes powered by reciprocating engines, which typically required less runway length than the first generation of commercial turbojet airplanes. The Safety Board analyzed aircraft accidents and incidents in which airport physical limitations may have been involved to assess the significance of such limitations. Several

of the 14 study airports were selected because they provided an opportunity to observe various physical constraints imposed by topographical features or community growth and their influence on operations at the airport.

As the Safety Board found in the case of all types of air carrier accidents, the number of air carrier undershoot, overshoot, and veer off accidents decreased substantially in the postcertification period (1973 through 1981). The accident rates (number of accidents occurring in the United States per million air carrier operations) in the 1973 through 1981 period decreased from the rates of the prior 9 years by about 60 percent for undershoots, by 51 percent for overshoots, and by 66 percent for veer offs. In relation to all air carrier accidents which occurred in the United States for the 1973 through 1981 period, undershoots accounted for 2.4 percent, overshoots for 3.2 percent, and veer offs for 3.6 percent. Almost 10 percent of the air carrier accidents from 1973 through 1981 either involved or could have involved aircraft encroachment on areas adjacent to runways. Twenty out of 29 undershoots and overshoots in the postcertification period involved substantial damage, and two of the overshoots and two of the undershoots resulted in fatalities.

Runway length, one of the primary indicators of physical airport constraints, appeared to have little direct relationship to the occurrence of undershoots. Factors such as the presence of some form of precipitation and availability of flight path guidance were of more significance in undershoot accidents. However, as expected, overshoots were related to runway length as well as weather conditions conducive to degrading the runway surface stopping capability. Seventy-four percent of the air carrier overshoot accidents involving narrow-bodied, two- or three-engine turbojets between 1964 and 1981 occurred on runways shorter than 8,000 feet, and about half of all air carrier overshoots between 1964 and 1981 occurred in inclement weather (rain, sleet, or snow). Safety Board records also show that flightcrew operational errors were cited in nearly all encroachment accidents where causal or contributing factors were assigned. Although it is more likely that overshoots will occur on shorter runways, the Safety Board found that 11 percent of the narrow-bodied, two- or three-engine turbojet overshoots occurred on runways that were 9,000 feet or longer.

In the Safety Board's special investigation report of operations on contaminated runways, 8/ the Board discussed the runway length safety margins provided by existing FAA certification and operational standards and concluded that the FAA should adopt rules which will provide adequate runway length safety margins in relation to existing conditions. Increasing the runway length required for operations from contaminated surfaces, which could result in the need to reduce airplane operating weight at airports with shorter runways in order to avoid exceeding the runway length available, is one method of compensating for degraded stopping capability and reducing the potential for an overrun.

Although adequate runway length safety margins for contaminated runway conditions would reduce overrun possibilities, the Safety Board's survey of encroachment accidents also showed that overruns have occurred on runways of 9,000 feet or longer and that undershoots may occur on any length runway. Therefore, the Safety Board investigated other measures, such as safety areas and frangible structures, which can mitigate the consequences of encroachment-type accidents.

8/ Special Investigation Report--"Large Airplane Operation on Contaminated Runways" (NTSB-SIR-83-2).



In visits to the 14 study airports, the Safety Board staff found that the dimensions of safety areas were generally acceptable in the areas along the sides of the runways. At the constrained airports, such as New York LaGuardia, Chicago Midway, Burbank-Glendale-Pasadena, San Diego Lindbergh, Houston Hobby, Boston Logan, and Washington National, the safety areas at the ends of the runways were marginal or nonexistent, and there were no extended runway safety areas at these airports. There were extended runway safety areas at many of the larger airports, but even at the larger airports some safety areas were smaller in size than recommended by FAA design guidelines of AC 150/5335-4. However, because of the length of the runways at these airports, an extra margin normally is available to prevent an overrun.

The continual problem of encroachment by the surrounding community, which is the result of geographical barriers and conflicting interests and improper land use planning, renders unlikely any substantial increase in the size of runway end safety areas at most airports. However, at Boston Logan, the Safety Board was introduced to a possible alternative to extended runway safety areas--a unique plan which analyzed the feasibility of constructing inclined safety areas (ISA) gradually sloping downward at the ends of runways bordered by water. The concept, as described by the airport engineer and shown in a scale model, provides a transitional surface from the runway elevation to the water surface. The ISA would be surfaced with loose gravel or crushed stone, which provides more effective and safe arresting of aircraft than a conventional safety area. The use of an adaptation of the ISA at airports with limited hard-surface safety areas could significantly improve aircraft stopping capability in these areas, without having to increase their size. This concept merits further consideration by the FAA.

All of the airways facilities personnel at the airports visited indicated support for the use of frangible structures. Some airports, however, cannot readily incorporate frangible structures. New York LaGuardia, for example, is geographically bordered by water along several runway approach corridors which precludes the use of frangible approach light structures according to the FAA's program manager for low impact resistance structures (LIRS). He states that difficulties associated with designing frangible support structures for use in water are so complex that design criteria have not been developed by the FAA or the ICAO. In present water installations, approach light bars are attached to the submerged support structures with frangible fittings, but the support structures are not frangible. Factors which complicate attempts to design submerged support structures meeting low impact resistance criteria include wave frequency and characteristics, ice pressure, and water depth variations caused by tides. It is clear that it will be a difficult task to develop design criteria for support structures strong enough to withstand the effects of water-related forces yet having low impact resistance, but additional research to resolve the problem certainly merits conditions.

Natural and man-made objects may have a significant effect on air navigation and aircraft maneuvering, particularly during landing and takeoff operations. An airport which initially may have few limitations can become limited severely in its operations as man-made objects encroach upon the boundaries, or as natural objects, such as trees, grow in areas where aircraft approach or depart the airport. Title 14 CFR 139.61 states that the airport operator is responsible for insuring that obstructions within the confines of the airport boundaries are clearly marked and lighted. The regulation does not address objects outside the airport boundaries which have been determined to be obstructions.



The issues of land use and obstructive structures are complex matters involving conflicting interests. It is obvious that airport operators cannot exercise direct control over obstructions off the airport. Although Part 77 requires that the FAA be notified of proposed construction which might affect the airspace around an airport, the need for the FAA to use a criminal procedure to enforce this provision is a serious limitation. This topic was discussed in an FAA review in 1972 of the need "... to strengthen the agency's regulations and their application to all towers and other tall structures." The FAA decided that it would be beneficial to seek a change in the FAA Act of 1958 to permit a levy of a civil penalty in a case where a sponsor fails to give notice of construction as required by Part 77, rather than the criminal penalty in the Act. However, no known further action has been taken or is contemplated to change the law.

Although the Safety Board's study was confined to certificated air carrier airports, the review of airport obstruction information indicated that a more serious problem may exist at smaller, utility airports. In 1975, two accidents at such airports in which aircraft struck trees during night landing approaches prompted the Safety Board to issue Safety Recommendations A-75-81 and -82 on November 6, 1975, calling for identification of significant obstructions at public-use airports and the dissemination of such information to pilots. The airports that have precision and nonprecision instrument approaches have an increased degree of protection from obstacles and obstructions because of the approach surface standards that must be considered in approving the installation of these types of approach procedures. Utility airports that do not have instrument approach procedures to their runways do not have as high a degree of protection. The approach surface for these visual approach runways is at a slope of 20:1 instead of the 50:1 slope for instrument runways.

In response to Safety Recommendations A-75-81 and -82, the FAA instituted the Airport Safety Data Program in 1981. Under this program, governed by FAA Order 5010.4, the inspection of public-use airports, through increased participation of State aviation organizations and private contractors, has improved collection and publication of airport obstruction data. However, a Safety Board review of the obstruction data provided in the FAA's Airport/Facility Directory (AFD) found it to be of limited value for operational purposes. For example, at many utility airports objects of a permanent nature are listed in the AFD if the objects lie within the boundaries of Part 77 approach surfaces; however, descriptive data about the size or location of the object relative to the runway end or centerline are not reported. Since this type of information is collected under the Airport Safety Data Program, the FAA should publish the descriptive data about significant objects as an approach or departure planning aid for pilots.

The Safety Board also noted that the lighting of obstructions is not consistently reported in the AFD and that there is no information about changes to operational procedures which may be dictated by the presence of an obstruction within the Part 77 approach surface boundaries. Since applicants for a pilot's license are not tested for knowledge of information in Part 77 or regarding information pertaining to hazards or obstructions in any other aeronautical publications, the Board believes that incorporating some explanatory material in the AFD regarding this subject would be beneficial.

Because navigation equipment plays an important part in determining an airport's operational flexibility and because the reliability of navigational aids (NAVAID's) could have safety implications, the study team surveyed airways facility staff at all the study airports to learn about problem areas. All of the airports visited had some problems with their NAVAID's. Most of the problems were associated with the age of the NAVAID equipment.

This was especially true of the tube-type instrument landing systems (ILS's). The FAA has an ongoing program to replace vacuum tube-type ILS's with solid-state equipment. At the end of fiscal year 1983, approximately two-thirds of the ILS's in this country had been retrofitted, according to airways facility staff at FAA headquarters.

The FAA has not had an active hiring program for the airways facility sector in several years. FAA headquarters management believes that the hiring and training of new personnel is unwarranted because the FAA's current Navaid Modernization Program will eliminate the need to have the present number of airways facility technical personnel. However, many airways facility personnel expressed concern over the FAA's ability to implement and complete this modernization program in a timely manner; they were especially concerned with their ability to adequately maintain the older NAVAID systems during the period of building, testing, and commissioning of the new systems. For example, Houston Hobby airway facility personnel said that a majority of their technicians would be eligible to retire within the next 5 to 8 years. Only three of their radar technicians will remain in 6 years, and it takes at least 3 years to fully train a radar technician. Boston Logan airway facility personnel said that about 46 percent of their technicians would be eligible for retirement by 1989. Boston Logan currently has no trainees, and it reported that 3 to 4 years are needed to bring a "new hire" up to "journeyman" level. Washington National airway facility personnel said that 11 out of 28 technicians would be eligible to retire within the next 5 years.

Therefore, the National Transportation Safety Board recommends that the Federal Aviation Administration:

Amend 14 CFR 139.65, "Public Protection," to require safeguards against unauthorized entry of persons and inadvertent entry of large animals onto any airport operations area. (Class II, Priority Action) (A-84-21)

Revise FAA Order 5280.5, "Public Protection," to establish criteria for acceptable types of fencing and support structure and a policy for gate security for the air operations area at certificated airports. (Class II, Priority Action) (A-84-22)

Revise FAA Order 5280.5, "Ground Vehicles," to include specific criteria for determining the adequacy of ground vehicle control, such as the number of ground vehicle accidents each year, disciplinary actions taken in accident cases, the number of repeat offenders, and an annual accident rate. (Class II, Priority Action) (A-84-23)

Establish an airport directorate within the FAA, similar to aircraft certification directorates, having technical resources and authority to provide leadership for the airport certification program and consistent application of 14 CFR Part 139. (Class III, Longer-Term Action) (A-84-24)

Certificate fueling personnel at certificated airports. (Class III, Longer-Term Action) (A-84-25)

Establish designated fueler certification examiners to ensure a uniform standard for fueling training, knowledge, and competence at certificated airports. (Class III, Longer-Term Action) (A-84-26)

As an interim measure until a program for certificating fueling personnel can be established, revise the compliance criteria applicable to certificated airports in FAA Order 5280.5, "Handling and Storage of Hazardous Material," to contain specific standards for initial and recurrent training of fueling personnel, which address methods of assuring fuel quality, fire prevention, vehicle inspection and operation, proper fueling techniques, and knowledge of airport operating rules. (Class II, Priority Action) (A-84-27)

Revise the compliance criteria in FAA Order 5280.5, "Handling and Storage of Hazardous Material," to incorporate detailed procedures for fuel storage area inspections and specific facility acceptability criteria. (Class II, Priority Action) (A-84-28)

Require certificated airports to include fuel storage and dispensing facilities in the selfinspection program prescribed in 14 CFR 139.57 and 139.91 and specify the items, including tank overfill warning devices, which must be checked and approved by airport inspection staff. (Class II, Priority Action) (A-84-29)

Adopt design and construction standards for fuel storage area site selection and safety devices at airport fuel storage facilities to be applied uniformly to new airports receiving Federal funds or to currently certificated airports when storage facilities are relocated. (Class III, Longer-Term Action) (A-84-30)

Revise 14 CFR 139.49(b) crash-fire-rescue index requirements for water and extinguishing agents to include the recommendations for extinguishing agents specified by the International Civil Aviation Organization or as published in FAA Advisory Circular 150/5210-6B. (Class II, Priority Action) (A-84-31)

Revise 14 CFR 139.49(h) to require a minimum of two firefighters per vehicle and to specifically define minimum standards for training of crash-fire-rescue personnel. (Class II, Priority Action) (A-84-32)

Revise FAA Order 5280.5, "Fire Fighting and Rescue," to prescribe equipment equal to or better than the proximity suit with lining that is recommended in paragraph 154d, as acceptable for aircraft firefighting and to contain standards by which the adequacy of this protective clothing can be determined for the most extreme exposure conditions which can be safely encountered. (Class II, Priority Action) (A-84-33)

Amend 14 CFR 139.55 to require a full-scale demonstration of certificated airport emergency plans and procedures at least once every 2 years, and to require an annual validation of notification arrangements and coordination agreements with participating parties. (Class II, Priority Action) (A-84-34)

Incorporate in any 14 CFR Part 139 rulemaking proposal calling for a reduction in crash-fire-rescue capability at index A and B airports a list of affected airports, a list of types and schedules of air carrier aircraft serving these airports, and a description of the effect of such a reduction on the firefighting posture of the airports. (Class II, Priority Action) (A-84-35)

Initiate research and development activities to establish the feasibility of submerged low-impact resistance support structures for airport facilities, and promulgate a design standard, if such structures are found to be practical. (Class II, Priority Action) (A-84-36)

Initiate research and development activities to establish the feasibility of soft-ground aircraft arresting systems and promulgate a design standard, if the systems are found to be practical. (Class III, Longer-Term Action) (A-84-37)

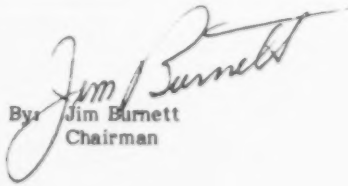
Where elimination of obstructions that have a significant adverse effect on aircraft operation at public-use airports is not feasible, publish detailed data on the location of the obstructions and corresponding operational procedures or flight restrictions in the Airport/Facility Directory. (Class II, Priority Action) (A-84-38)

Seek statutory authority to prescribe civil penalties for sponsors of proposed construction who fail to comply with the notification requirements of Subpart B of 14 CFR Part 77. (Class II, Priority Action) (A-84-39)

Incorporate into pilot training programs and appropriate aeronautical publications sufficient information on the Airport Safety Data Program to familiarize airmen with the criteria in 14 CFR Part 77 used to determine whether an object is an obstruction to air navigation that might adversely affect aircraft operations. (Class III, Longer-Term Action) (A-84-40)

Provide continuing maintenance services for existing navigational facilities during the period of transition to the new generation of equipment. (Class II, Priority Action) (A-84-41)

BURNETT, Chairman, GOLDMAN, Vice Chairman, and BURSLEY, ENGEN, and GROSE, Members, concurred in these recommendations.

By  Jim Burnett  
Chairman

NATIONAL TRANSPORTATION SAFETY BOARD  
WASHINGTON, D.C. 20594

SAFETY STUDY

Adopted: April 11, 1984

AIRPORT CERTIFICATION AND OPERATIONS

INTRODUCTION

The Federal government has long been concerned with the safety of aircraft operations on or near airports. In a 1952 directive, which established a temporary Airport Commission chaired by James H. Doolittle, President Harry S. Truman wrote, "... I have been seriously concerned about airplane accidents, both commercial and military, that have occurred in the take-off and landing of aircraft, especially in heavily populated areas..." In directing that a study of airport location and use be undertaken by the Airport Commission, the President stated that: "... provision must be made for the safety, welfare and peace of mind of the people living in close proximity to airports..." The President also instructed the commission to give recognition "... to the importance of a progressive and efficient aviation industry in our national economy..." The Airport Commission report recommended action to alleviate problems involving location and use of airports, and the report proposed policies and procedures for the sound and orderly development of a national system of airports. <sup>1/</sup>

Interest in the issue of airport safety again peaked in the late 1960's when the General Accounting Office (GAO) initiated a review of the Federal Aviation Administration's (FAA) control and inspection of public airports, and Congress considered legislation to provide for the expansion and improvement of the nation's airport and airway system. During this review, the GAO found that, although the FAA had general authority under the Federal Aviation Act of 1958 to establish minimum mandatory safety standards for air carrier and general aviation airports, no specific program existed to evaluate the safety of public airports. The GAO reported that the FAA was relying on airport inspections under other programs that did not have safety as a primary objective to provide safety overview. The GAO also found that:

In 1967, the Agency [FAA] conducted a test safety inspection program at 32 public airports and found conditions that could cause accidents. Some of these conditions were previously unknown to the Agency and to airport management. An Agency official said that this program had been discontinued because [limitations] established by the Department of Transportation had not permitted the Agency to obtain the necessary additional manpower. . . . <sup>2/</sup>

While its review was in progress, the GAO furnished its interim findings regarding airport safety inspection to congressional committees considering bills for improvement of the nation's airport and airway system. At congressional hearings in 1969, the GAO findings were supplemented by information obtained in the course of accident investigations conducted by the National Transportation Safety Board and by testimony reflecting the extensive, collective experience of airport user organizations. During the

<sup>1/</sup> "The Airport and Its Neighbors—The Report of the President's Airport Commission," May 16, 1952.

<sup>2/</sup> "Report to the Congress--Airport Safety Inspection Program Needed to Improve Flight Safety of Civil Aircraft," B-164497(1), January 15, 1971, p. 1.

legislative process, the House Committee on Interstate and Foreign Commerce issued report No. 91-601, dated October 27, 1968, which summarized convincingly the need for a specific airport certification program:

Standards for airport construction, operation, and maintenance have been developed, but these are not mandatory, nor does the Federal Government certify that these standards are met. On most air carrier airports the airport owner has contracted to adhere to Federal standards but there is now no assurance that the contractual obligations are being maintained. Even in cases of noncompliance with the standards, the remedies available are limited to withholding Federal grants where they exist, but this still does not assure the safety hazard has been promptly corrected or, better yet, not allowed to develop.

In May 1970, the Congress passed Public Law 91-258, Airport and Airway Development Act, which amended the Federal Aviation Act of 1958 by empowering the FAA "... to issue airport operating certificates to airports serving air carriers certificated by the Civil Aeronautics Board [CAB] and to establish minimum safety standards for the operation of such airports." The act also required anyone "... desiring to operate an airport serving air carriers certificated by the Civil Aeronautics Board ..." to file an application for an airport operating certificate.

To implement the legislative mandate for an airport certification program, the FAA developed Part 139 of Title 14 of the Code of Federal Regulations (CFR) which addressed a wide range of airport facilities, services, physical features, and operating procedures. Part 139 was issued in June 1972 and became effective on July 21, 1972; the airports to which Part 139 applied were required to obtain operating certificates by May 20, 1973.

Despite improvements growing out of the legislative and program initiatives taken to improve airport safety, the Safety Board, in the course of its accident investigations and study activities, continued to uncover concerns regarding airport safety. For example, since 1976 the Safety Board has issued recommendations concerning:

- o Currency of airport operations manuals
- o Crash-fire-rescue capabilities
- o Emergency and disaster planning
- o Fuel storage and dispensing procedures
- o Delethalization of safety areas around airports
- o Runway surface condition testing and maintenance
- o Wet runway effect on airplane performance
- o Bird hazard mitigation

In 1982, accidents near Washington National Airport, <sup>3/</sup> at Boston Logan Airport, <sup>4/</sup> and near New Orleans International Airport <sup>5/</sup> tragically involved many

<sup>3/</sup> Aircraft Accident Report--"Air Florida, Inc., Boeing 737-222, N62AF, Collision with 14th Street Bridge, near Washington National Airport, Washington, D.C., January 13, 1982" (NTSB-AAR-82-8).

<sup>4/</sup> Aircraft Accident Report--"World Airways, Inc., Flight 30H, McDonnell Douglas DC-10-30, Boston Logan International Airport, Boston, Massachusetts, January 23, 1982" (NTSB-AAR-82-15).

<sup>5/</sup> Aircraft Accident Report--"Pan American World Airways, Inc., Clipper 759, Boeing 727-235, N4737, New Orleans International Airport, Kenner, Louisiana, July 9, 1982" (NTSB-AAR-83-2).



long-standing concerns for the safety of aircraft operations in the airport environment. In response to the significant safety issues raised by the Washington and Boston accidents, the Safety Board conducted a special investigation 6/ to explore the problems of large airplane operations on contaminated 7/ runways. This special investigation focused on information about runway conditions and their relationship to airplane performance, as well as problems in communicating such information among the various elements of the air transportation system.

In October 1982, the Safety Board initiated this safety study of airport certification and operations to examine in depth two of the three major elements of airport safety-- maintenance and operation of airport facilities and airport physical features. The third major element, aircraft operation, is addressed only briefly in this study, because it is an extensive topic which involves several complex facets such as design and performance of aircraft, development and application of operational procedures, reliability and availability of navigational aids, and the accuracy and timeliness of communicating important information in the airport environment.

This safety study examines the background and scope of 14 CFR Part 139 as it concerns the maintenance and operation of airport facilities; the FAA's administration of the airport certification program; the results of certification activities; airport physical limitations; and other related safety considerations. Based on the results of this study, the Safety Board makes 21 recommendations to the FAA seeking to improve safety at airports.

#### STUDY METHOD

The Safety Board formed a five-person study team to explore the following general areas:

- o Airport facility operation and maintenance
- o Crash-fire-rescue capability
- o FAA regional management and airport management perspectives of the certification program
- o Aircraft operating considerations

Selected for the study were airports that would permit comparison of airport certification and surveillance methods employed by different FAA regional offices as well as observation of operations at some physically limited older facilities and some less constrained newer airports located in the same geographical area. Parameters considered included passenger enplanements, runway length, safety area characteristics, dates of construction or modification, accident and incident histories, and approach area characteristics. All but one of the airports chosen were selected from among the 36 large hub airports, 8/ which handle a large number of total aircraft departures, serve the

6/ Special Investigation Report: "Large Airplane Operation on Contaminated Runways" (NTSB-SIR-83-2).

7/ "Contaminated" as used in the referenced report and in this report means that ice, snow, slush, water, or rubber deposits have accumulated on the runway to the extent that airplane performance is affected measurably.

8/ According to the Civil Aeronautics Board report "Airport Activity Statistics of Certificated Route Air Carriers" for 1981, the 36 large hub airports serve 24 major population centers which account for 70 percent of all revenue passenger enplanements. In contrast, the 43 medium hub airports serve only 19 percent of the revenue passenger enplanements, and the small hub airports account for about 7.5 percent of the revenue passenger enplanements.

largest volume of revenue passengers, and are located in geographical areas served by more than one certificated airport (see appendix A, table XIX). After weighing these considerations, obtaining the viewpoints of representatives of the Air Line Pilots Association, the Airport Operators Council International, and the American Association of Airport Executives, a group of 14 airports in 7 different FAA regions was chosen, including 5 airport pairs. The airports chosen for study were: Washington National, Dulles International, Kennedy International, New York LaGuardia, Los Angeles International, Burbank-Glendale-Pasadena, Houston Intercontinental, Houston Hobby, Chicago O'Hare, Chicago Midway, San Diego Lindbergh, Denver Stapleton, Boston Logan, and Ft. Lauderdale-Hollywood, Florida. (The size, operational activity, and reasons for including each airport in the study group are documented in appendix A, tables I and II.)

Team members, working individually and collectively, defined the information that was to be gathered in each area of interest and how the information could be used to attain the study objectives of assessing airport certification activities and identifying potential safety problems associated with physical limitations at airports. Although the airport certification process does not cover approach procedures, navigational facility operation, or aircraft operations, such matters cannot be dismissed in any discussion of airport safety; therefore, some operational concerns such as noise abatement and navigational aid problems also are discussed in this report.

### AIRPORT CERTIFICATION PROGRAM

#### Background and Scope of 14 CFR Part 139

The intent of Congress in enacting legislation to require the certification of airports is summarized in the following excerpt from the Report of the House Committee on Interstate and Foreign Commerce, No. 91-601, dated October 27, 1969:

...The airport is an instrumentality of interstate and foreign commerce. It is used by the public and the manner in which it is maintained and operated is vital to the public safety. It is in the public interest that the airport be certificated by the Federal Government as to its adequacy for the safe conduct of flight operations in the national air transportation system.

To implement the legislative mandate for airport certification contained in the Airport and Airway Development Act of 1970, the FAA promulgated 14 CFR Part 139--Certification and Operations: Land Airports Serving CAB-Certificated Scheduled Air Carriers Operating Large Aircraft. Part 139 was issued on June 12, 1972, and became effective on July 21, 1972. The airports to which Part 139 applied were required to obtain operating certificates by May 20, 1973. The FAA also amended 14 CFR Part 121 to prohibit, after May 20, 1973, operations by air carriers <sup>9/</sup> into airports that do not hold airport operating certificates.

Under Part 139, two types of airport operating certificates can be issued--a "full" certificate and a "limited" certificate. Land airports serving scheduled air carriers operating large aircraft need a full certificate; however, airports serving air carriers conducting only unscheduled operations or operations with small aircraft can apply for a

<sup>9/</sup> Air carrier as used in Part 139 refers to those air carriers holding a certificate of public convenience and necessity issued by the CAB.

limited certificate. To obtain a full certificate, an airport must comply with all provisions of Part 139, unless exemptions from particular requirements are granted by the FAA. A limited certificate may be issued to an airport when the FAA "... finds that it would be contrary to the public interest to require compliance with all applicable requirements of this Part [139], and that the airport is otherwise properly and adequately equipped to conduct a safe operation for the kind of air carrier operation proposed." All the airports surveyed in this study had full airport operating certificates.

To develop Part 139, the FAA formed a study group to delineate airport certification requirements and plan for their implementation. The study group, composed of staff from FAA's Airport Service, Flight Standards Service, and Air Traffic Service offices, stated that airport safety depended upon:

- o Airport design
- o Aircraft operations
- o Maintenance and protection of airport facilities

Of these three elements, only the last was not being monitored by an existing FAA inspection program; therefore, the study group believed that airport facility maintenance, protection, and operation should be covered by the airport certification program. Within these broad guidelines, specific requirements in Part 139 were developed, and many were revised over the following decade. In general, Part 139 rules pertain to maintenance and operation of "airside facilities" in the airport operating area; terminal facilities, vehicular access to the airport, and other "landside" considerations are not included in Part 139 regulations. (The airport facilities and operations which must meet 14 CFR Part 139 requirements are described by the applicable section in appendix A, table III.)

The most recent legislative mandate affecting airport certification, the Airport and Airway Improvement Act of 1982 (Public Law 97-248), revised the requirement defining which airports must be certificated by the FAA. Under the Act, airports "... that serve any scheduled or unscheduled passenger operation of air carrier aircraft designed for more than 30 passenger seats" must obtain an airport operating certificate. The effects of this new provision, in terms of increasing or decreasing the number of certificated airports, is being evaluated by the FAA.

#### Program Administration

The airport certification program is administered by the FAA regional offices by a certification inspection staff within the regional Airports Division. In addition to certification and surveillance responsibilities, the Airports Division handles:

- o Airport planning
- o Environmental assessment
- o Airport planning grants and airport development grants
- o Airport compliance with design and construction standards

The airport certification inspection staff may be located physically in the FAA regional office or in an Airport District Office that may be separated geographically from the regional headquarters. Although airport certification is managed regionally, the Safety and Compliance Division within the Office of Airport Standards at FAA Headquarters directly advises regional staff and maintains certification activity records in order to monitor program effectiveness.

The principal process used by the FAA to implement the airport certification program is the facility inspection. Airport inspections are the basis for determining if an airport's facilities, maintenance, and operations meet the regulatory requirements of Part 139. FAA Order 5280.5, <sup>10</sup> which contains policy guidance and standard procedures for FAA personnel to conduct the certification program, gives the following policy guidance for inspection activities:

102. General. The certification program operates under the philosophy that the airport operator's self-inspection program, resulting in the day-to-day compliance with applicable safety regulations, is the primary responsibility of airport management. The airport certification onsite inspection actually results in an evaluation of the adequacy of the operators' procedures on self-inspection, notification, corrective maintenance and planning that are continually in effect.

In effect, the FAA certification inspectors are evaluating periodically the airport operators' day-to-day procedures for maintaining and operating the facility in compliance with Federal standards, as well as assuring that the airport fully complies with 14 CFR Part 139.

The qualifications for an airport certification safety inspector are listed in paragraph 14 of FAA Order 5280.5 which, in part, states:

...the incumbent should possess a broad knowledge of airport and aircraft operations with emphasis on visual navigational aids, lighting and marking, obstructions, operational surfaces, fire and rescue service, passenger and public protection and emergency planning. He/she should have a working knowledge and understanding of Federal Statutes. He/she should be able to deal effectively on controversial matters with a wide variety of officials and groups involved in airport management, and in agency review and regulation of airport activities.

The types of inspections performed as part of certification program activities are defined in FAA Order 5280.5 as:

Initial Inspection: First inspection conducted by an airport certification safety inspector prior to approval for certification.

Annual Inspection: Conducted annually to insure full compliance with [14 CFR] Part 139. A full record and report of the inspection must be made.

Follow-up Inspections: Conducted as deemed necessary by the certification personnel in each region. Normally they would be done to check on significant problem areas or by a call from the airport manager. They are very flexible in coverage but a record must be made of the visit.

<sup>10</sup>/ Federal Aviation Administration Order 5280.5, Airport Certification Program Handbook, March 21, 1977, reprinted June 1982 (includes change 1).

Surveillance Inspection... Conducted under the circumstances... dictate a deviation from normal notification procedures. This may be the result of a marginal annual inspection, an unexpected opportunity to "stop" in while flying enroute to another airport or a deliberate effort to test the airport's continued compliance with [14 CFR] Part 139 requirements.

FAA Order 5280.5 also describes various tasks which should be accomplished during inspections. Figure 1 shows how the certification process relates to other FAA services and segments of the aviation and local communities. The certification inspection process is portrayed above the dashed line in figure 1, which shows the key elements of the inspection--review of the airport operations manual and other preinspection preparation, contacting other FAA services for information regarding possible problems, onsite inspection of airport facilities and procedures, review of airport selfinspection capabilities, and determining corrective measures dictated by inspection findings. The activities related to the certification process but not a part of it are shown below the dashed line in figure 1.

Some criteria, by which inspectors can judge an airport's compliance with the Federal requirements in the various sections of Part 139, are given in FAA Order 5280.5; however, many of these criteria are presented in qualitative terms, which lead to subjective evaluations by certification inspectors. The following examples of subjective criteria for sections of Part 139 are from FAA Order 5280.5:

Personnel - 139.23 and 139.81. The certification inspector will determine that:

- (1) The airport has made provisions for sufficient qualified personnel to conduct daily safety inspections, routine maintenance, removal of snow, airport fire fighting...

\* \* \*

Fire Fighting and Rescue - 139.49 and 139.89. The certification inspector will determine that:...

\* \* \*

- (3) The airport has available trained personnel to insure that all required vehicles are operational...

\* \* \*

Hazardous Material - 139.51. The certification inspector will determine that:...

\* \* \*

- (3) The airport manager or a tenant, as the fueling agent has trained personnel, safe procedures for storage, dispersing and handling fuel, lubricants and oxygen on the airport. [Emphasis added]

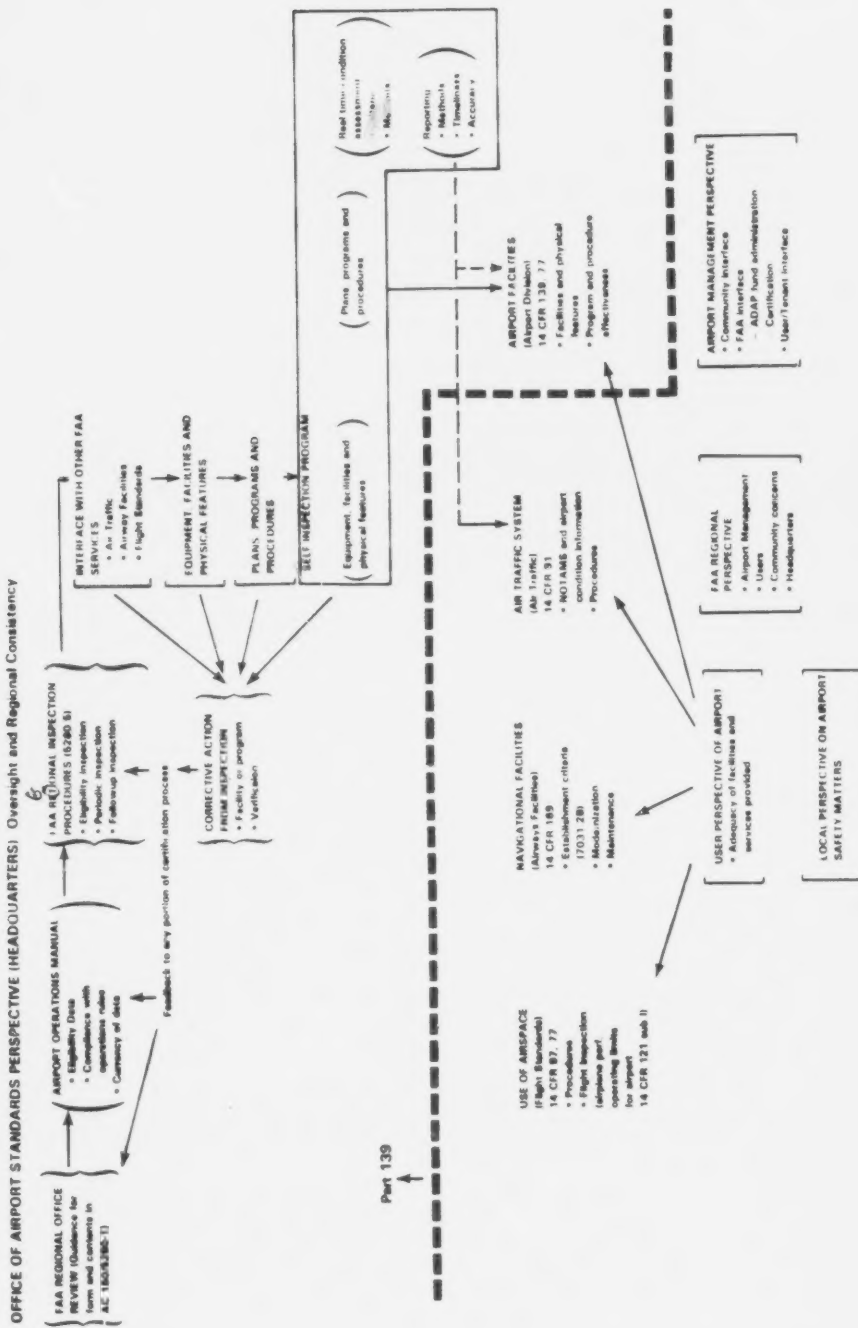


Figure 1.--Airport certification program and other FAA activities related to terminal area operations.



In each of the above examples, the inspector would have to make a subjective decision about the underlined words because there are no guidelines for qualitative descriptors such as "sufficient," "qualified," "trained," or "safe" in FAA Order 5280.5.

The subjectivity inherent in aspects of the airport inspection process are acknowledged in the airport certification inspector requirements stated in paragraph 13 of FAA Order 5280.5:

REQUIREMENTS. The certification safety inspector is engaged in inspections of airport operations, airport physical layout, visual navigational aids, and other related factors to determine compliance with [14 CFR] Part 139... The inspector must make qualitative rather than quantitative judgements regarding each of the required standards.

#### Analysis of the Program

The basic tasks in evaluating a program are defining the program goals, measuring the degree to which goals or objectives have been achieved, and defining the process used to pursue the objectives so that any changes needed to enhance program effectiveness can be made intelligently. The objective of the airport certification program, clearly articulated in the legislative mandate, is stated in FAA Order 5280.5 as follows:

...to provide a reasonable program for the enhancement of airport safety in a manner beneficial to the aviation industry.

The airport certification program is intended to achieve safety improvements by requiring proper maintenance and operation of airport facilities, recommending the upgrading of facilities, and assuring the availability of rescue and emergency services should a need arise. Therefore, as one possible measure or indicator of safety enhancement, the Safety Board studied statistical information that described airport facility improvement. Aircraft accident and incident data for the 18-year period 1964 through 1981 which included the inception of the certification program also were examined as a potential indicator of improved airport safety. The significance of rescue and emergency services was assessed through a review of accident site location data for the 18-year period 1964 through 1981.

Many improvements in airport facilities have been made in the past decade (see table 1). For example, between 1971 and 1981 the number of air carrier airports with at least one instrument landing system (ILS) has increased by 87 percent. In 1971, none of the 578 air carrier airports with at least one runway longer than 4,000 feet was subject to periodic facility and procedure review; by 1983, 662 airports had operating certificates and were subject to periodic inspection and surveillance. Although information regarding the number of airports in 1971 with at least one runway with surface treatment designed to improve friction is not available, a survey in 1983 indicated that 255 airports serving commercial turbojets (nearly 50 percent of all full certificate airports) have at least one runway with a surface treatment. The number of visual approach slope indicator (VASI) light systems, which provide vertical guidance to pilots, has increased more than 10 times (1,042 percent) since 1971.

To determine if the upgrading and regular inspection and surveillance of airport facilities has had a measurable effect on airport safety, the study team reviewed aviation accidents and incidents in which airport facilities, conditions, or personnel had been cited by the Safety Board as a cause or contributing factor for the 18-year period from 1964 through 1981. Since airports were required to have operating certificates in 1973 to serve CAB-certificated air carriers, comparisons were made (in most cases) between numbers and rates of accidents and incidents which occurred in the 9-year period (1964 through 1972) before certification and those occurring in the 9-year period (1973 through 1981) after certification.

For example, the total number of air carrier<sup>11</sup> (14 CFR Part 121) aircraft accidents occurring in the United States dropped from 1,002 in the 9-year precertification period to 499 in the 9-year postcertification period. The total number of airport-related <sup>11</sup>/accidents and incidents involving all types of aircraft was 3,236 in the precertification period (1964 through 1972) and 3,375 in the postcertification period (see appendix A, table IV). Airport-related accidents accounted for 6.8 percent of all accidents in the precertification period, and airport-related accidents were 7.6 percent of all accidents in the postcertification period. The level of airport-related accidents in comparison to all accidents remained stable at a relatively low percentage for the pre- and postcertification periods. However, the rate of airport-related accidents decreased 11 percent from 8.9 accidents per million operations <sup>12</sup>/ in the precertification period to 7.9 in the postcertification period. Airport-related accidents involving air carrier aircraft decreased from 63 in the precertification period to 52 after certification; this represented a 20-percent decrease in the rate of airport-related air carrier accidents from the precertification period to the postcertification period.

The yearly rates of all airport-related accidents decreased from 11.9 accidents per million operations in 1973 to 3.9 in 1980 (see appendix A, table V). The yearly rates of airport-related accidents involving air carriers for the years 1979 through 1981 (0.19, 0.30, and 0.42) were substantially lower than the 9-year period rate of 0.60 accident per million operations. While the number of fatal airport-related air carrier accidents increased from 1 in the 9-year precertification period to 3 in the similar postcertification period, the Safety Board did not consider it to be of statistical significance, because the number of accidents was so small that any change would cause large rate variations of dubious significance.

The airport certification regulations require that firefighting and rescue services be available at certificated airports in accordance with index standards established in Part 139. Although these services will not prevent accidents, they may significantly increase the survivability of certain types of crashes which occur within reach of the emergency equipment. An examination of the number of accidents which occurred within reach of the crash-fire-rescue service (see table 2) revealed that 51 percent of the air carrier accidents in the precertification period (1964 through 1972) occurred on the airport, where rescue and emergency services may have influenced accident survivability. About 13 percent of the precertification period accidents that occurred on the airport also involved a fire. In the postcertification period (1973 through 1981), 53 percent of the air carrier accidents occurred on the airport, and 18 percent of those involved a fire. While the number of air carrier accidents occurring on airports decreased 50 percent in the postcertification period, the 138 postcertification, on-airport air carrier accidents indicated a continuing need for emergency services at airports.

<sup>11</sup>/ Those accidents or incidents in which airport facilities, conditions, or staff were cited by the Safety Board as a cause or contributing factor.

<sup>12</sup>/ Operation is defined as a takeoff or landing in the FAA Air Traffic Activity Statistics report.

Table 1.--Descriptive statistics for certificated airports

|                                                                                                      | <u>1971</u>                    | <u>1980-1983</u>                                                                     |
|------------------------------------------------------------------------------------------------------|--------------------------------|--------------------------------------------------------------------------------------|
| Number of instrument landing systems (ILS) installed at air carrier airports in U.S. and territories | 280                            | 523 (1981 data)                                                                      |
| Number of air carrier airports with at least one runway longer than 4,000 feet                       | 578<br>(None was certificated) | 662 (as of May 1983)<br>Full certificate: 526<br>Limited certificate: 136            |
| Airports with at least one runway having a surface treated to improve traction                       | Not available                  | 363 (as of July 1983)                                                                |
| Total number of runways with surface treatment                                                       | Not available                  | 490 (as of July 1983)<br>Grooved: 281<br>Porous friction: 109<br>Others: 100         |
| Airports serving commercial turbojet aircraft with at least one surface-treated runway               | Not available                  | 255 (as of July 1983)<br>One treated runway: 185<br>More than one treated runway: 72 |
| Number of visual approach slope indicator (VASI) light systems at air carrier airports               | 119                            | 1,359 on 913 runways at airports certificated for air carrier operation              |

The number of airport-related accidents at each of the 14 airports selected for this study is relatively small (see appendix A, tables VI through IX), and the accident rates at these airports for each 9-year period were substantially less than the overall rate in the period for accidents at all airports in the United States.

The reduction in the postcertification-period, airport-related accident rates and the trends of decreasing rates of airport-related accidents in recent years indicates a measurable safety improvement at airports. Although the improvement cannot be directly correlated to the certification program because of the presence of other influencing factors that cannot be quantified, such as technological improvements in aircraft systems, upgraded navigational facilities, improved operational training, and increased operational awareness of terminal area difficulties, the trend is encouraging.

To assess further the safety improvement effectiveness of the airport certification program in recent years, the Safety Board studied the FAA's inspections of facilities, maintenance, and operations; fuel storage and dispensing; and crash-fire-rescue capabilities at the 14 study airports.

Table 2.--Accident site location of  
U.S. air carrier accidents and incidents occurring in the United States  
(including U.S. territories and possessions)

|                                    | 1964-1972 |       | 1973-1981 |       |
|------------------------------------|-----------|-------|-----------|-------|
|                                    | All       | Fire  | All       | Fire  |
| <u>Incidents</u>                   |           |       |           |       |
| Total                              | 457       | 12    | 237       | 5     |
| <u>Accidents</u>                   |           |       |           |       |
| Total                              | 545       | 86    | 262       | 39    |
| Fatal                              | 95        | 51    | 41        | 20    |
| Fatalities                         | 1,815     | 1,304 | 1,097     | 1,048 |
| Serious injuries                   | 626       | 334   | 505       | 174   |
| <u>Accidents on airport</u>        |           |       |           |       |
| Total                              | 279       | 35    | 138       | 25    |
| Fatal                              | 22        | 10    | 14        | 7     |
| Fatalities                         | 118       | 114   | 239       | 230   |
| Serious injuries                   | 190       | 94    | 277       | 94    |
| <u>Accidents within 1 mile</u>     |           |       |           |       |
| Total                              | 45        | 16    | 7         | 4     |
| Fatal                              | 13        | 10    | 5         | 4     |
| Fatalities                         | 274       | 269   | 398       | 396   |
| Serious injuries                   | 67        | 58    | 33        | 32    |
| <u>Accidents from 1 to 5 miles</u> |           |       |           |       |
| Total                              | 26        | 10    | 12        | 5     |
| Fatal                              | 14        | 9     | 7         | 4     |
| Fatalities                         | 255       | 228   | 253       | 247   |
| Serious injuries                   | 117       | 80    | 48        | 26    |
| <u>Accidents beyond 5 miles</u>    |           |       |           |       |
| Total                              | 195       | 25    | 105       | 5     |
| Fatal                              | 46        | 22    | 15        | 5     |
| Fatalities                         | 1,170     | 693   | 207       | 175   |
| Serious injuries                   | 252       | 102   | 147       | 22    |

FAA Inspections of Airport Facilities, Maintenance, and Operations - To assess the certification program, the Safety Board compared the most recent FAA annual inspection results with Safety Board onsite survey findings for each of the 14 study airports. The board's survey team visited 7 FAA regional offices and the 14 study airports between March 29, 1983, and June 6, 1983. During the visits to the regional offices, study team members reviewed FAA inspection files for the study airports, interviewed certification inspectors and managers, and interviewed Airways Facility Division and Air Traffic Division staff regarding the existence of any unusual or noteworthy situations at the study airports.

The Safety Board's facility checks confirmed the accuracy of FAA inspection findings for pavement area conditions (14 CFR 139.43 and 139.83) and marking and lighting runways, thresholds, and taxiways (14 CFR 139.47 and 139.87) at all but one of the study airports. At that airport, Los Angeles International, although FAA inspection records showed no pavement or lighting problems, the Safety Board found ungrooved patches over two parallel cracks running the full length of a grooved runway. The ungrooved patches were from 2 to 3 feet wide and were between 10 and 15 feet apart. Under wet runway conditions, the grooved runway surface and ungrooved patches probably would have different retarding capabilities which could affect an airplane's acceleration and stopping performance and its directional control. The Safety Board also noted damage to centerline lighting at this airport.

For the study airports, FAA inspection records regarding protection of navigational aids (14 CFR 139.63), bird hazard reduction (14 CFR 139.67), construction area marking (14 CFR 139.71), and snow removal (14 CFR 139.85) were found to be accurate, and no serious deficiencies were noted in these areas. However, the Safety Board did find that the airports had several different methods of satisfying these requirements. For example, bird hazard reduction efforts observed at the study airports included the use of bird petrol vehicles and shotguns with special shells to scare birds, the use of tainted food to make birds sick, planting different varieties of flowers, and employing an ornithologist to devise methods of reducing the local bird population. The bird problems at the study airports were being controlled, to the extent possible, and airport operations staff were well aware of the potential hazard posed by birds.

Snow removal procedures also varied among the study airports; some airport operators contracted the entire operation, while others did all removal and positioning with airport staff and equipment. Although the study airports had different procedures, each seemed to be appropriate for the local conditions, and responsible personnel were very knowledgeable about the effectiveness of procedures. Part 139 requires that procedures for airport operations, such as snow removal and positioning, be included in the airport operations manual; however, the snow removal plans are not required to have specific quantitative criteria for clearing runways or suspending operations. Inclusion of criteria, as determined by each airport and approved by the FAA in the airport operations manual, would assure greater objectivity in decisions involving snow removal and aircraft operations.

As a result of its investigation of the World Airways accident at Boston Logan on January 23, 1982, 13/ the Safety Board issued Safety Recommendation A-82-152 on December 23, 1982:

13/ Aircraft Accident Report: "World Airways, Inc., Flight 30H, McDonnell Douglas DC-10-30, Boston Logan International Airport, Boston, Massachusetts, January 23, 1982" (NTSB-AAR-82-15).

Amend 14 CFR 139.31 and 14 CFR 139.32 to require that airports certificated under 14 CFR 139 and located in areas subject to snow or freezing precipitation have an adequate snow removal plan, which includes criteria for closing, inspecting, and clearing contaminated runways following receipt of "poor" or "nil" braking action reports and to define the maximum snow or slush depth permissible for continued flight operations.

The FAA replied on April 1, 1983, that 14 CFR Part 139 was being reviewed for possible changes that would be set forth in a Notice of Proposed Rulemaking (NPRM) to be issued in the near future. To date, an NPRM has not been issued, and the recommendation remains in an "Open—Acceptable Action" status.

FAA inspectors had approved many different selfinspection programs (14 CFR 139.57) at the study airports, and the Safety Board found that the daily inspection procedures used at each airport were effective. In general, airport employees assigned as operations inspectors were knowledgeable and conscientious in the performance of their daily inspections. However, on one night shift inspection witnessed by a study team member at Chicago O'Hare the operations specialist left broken runway lights adjacent to the runway and failed to report an 8-inch-square piece of asphalt which had been dislodged from the runway centerline. The day shift operations specialist at O'Hare performed a thorough and careful inspection. As a result of observing at least one of the daily airport operations area 14/ inspections at each study airport, the Board discovered that maintenance policies differed considerably. At some airports, certain conditions were allowed to go uncorrected for longer periods than at others. Examples of such conditions were:

- o growth of grass through asphalt cracks on aprons, ramps, taxiways, and runup areas;
- o small areas of asphalt deterioration on ramps and taxiways;
- o plugged drains;
- o washout areas near taxiways;
- o collapsed or worn grooving on runways (examples are shown in figure 2).

Such conditions may not pose problems when they first occur, but as maintenance is delayed, more serious problems can arise. For example, deterioration of asphalt can lead to separation of larger asphalt pieces, which may become a potential hazard to aircraft operations, and collapsed grooving may lead to loss of grooving effectiveness, thus compromising the stopping performance of airplanes.

As in the case of selfinspection procedures, FAA inspectors found no problems with the condition assessment and reporting (14 CFR 139.69) methods at the study airports. The Safety Board found that a variety of equipment was used for the local dissemination

14/ The airport operations area (AOA) is an area of the airport used or intended to be used for landing, takeoff, or surface maneuvering of an aircraft.



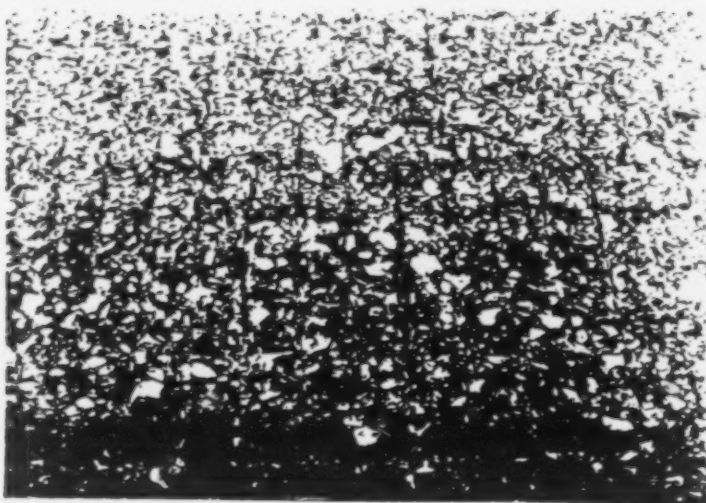


Figure 2.--Good grooving condition on runway at Boston Logan (top), and worn grooving condition on runway at Chicago O'Hare (bottom)

of airport conditions and that all airport operations personnel were using the Notice to Airmen (NOTAM) system. <sup>15/</sup>

Runway condition assessments are made for either maintenance or operational purposes. Maintenance condition assessments may involve visual inspections of runways to detect surface deterioration or accumulation of rubber deposits or may involve measurements of runway friction coefficients at periodic intervals using a mu-meter or James decelerometer <sup>16/</sup> to help determine when to remove rubber deposits. Dulles International, New York La Guardia, Kennedy International, Boston Logan, and Denver Stapleton had mu-meters but used them only occasionally. Dulles International and New York La Guardia had recorded several years of coefficient of friction data for their runways, which they used in assessing runway conditions for maintenance. Runway operating conditions were evaluated at all of the study airports when a runway was covered with water, snow, slush, or ice which might reduce airplane directional control or stopping capability. At Ft. Lauderdale-Hollywood and Burbank-Glendale-Pasadena, the airport management furnished a driver and vehicle to the airport tenants so that they could inspect runway conditions and measure water depth. Similar inspections were made by operations officers at the remaining study airports during periods of inclement weather. However, at all the study airports, transmission of braking action reports (good, fair, poor, or nil) made by pilots on prior flights using a runway was the primary method of operational condition assessment used by airport management for that runway. Washington National, New York La Guardia, Chicago O'Hare, and Dulles International had runway condition sensors, which gave airport management better data on runway surface temperature and condition (wet, dry, or ice-covered). The airport managers used this information for timing snow removal operations and the application of the various types of runway compounds to improve surface friction.

The Safety Board's special investigation of airplane operations on contaminated runways <sup>17/</sup> already has provided an in-depth review of problems in assessing, and in reporting runway conditions and in performing timely maintenance, as well as the need for correlating measured surface conditions with aircraft performance data. The Board's onsite observations corroborated the conclusions of the special investigation that runway surface condition assessment for operational purposes is subjective at many certificated airports and that there is a need to pursue objective methods of providing surface condition information which is usable by operators.

No unsatisfactory trends in ground vehicle operations (14 CFR 139.59) were reported in recent FAA inspections of the study airports, but the Safety Board's survey found distinct differences in the degree of airport management control over ground vehicle operations and conditions at the various airports. Some airports, such as Boston Logan, New York La Guardia, Kennedy International, Dulles International, and Washington National, required annual inspections of all vehicles driven in the aircraft operating area. All study airports except Ft. Lauderdale-Hollywood, Chicago O'Hare, Chicago Midway, and Los Angeles International maintained strict driver standards through the suspension of airport operations area driving privileges in cases of poor performance. At airports where

<sup>15/</sup> A system of disseminating information, through periodic publication or briefings, concerning the establishment, condition, or change in any component (facility, service, or procedures) of, or hazard in the National Airspace System, the timely knowledge of which is essential to personnel concerned with flight operations

<sup>16/</sup> Mechanical devices used to measure the coefficient of friction of paved surfaces.

<sup>17/</sup> Special Investigation Report: "Large Airplane Operation on Contaminated Runways" (NTSB-SIR-83-2) (adopted April 22, 1983).

there was less vigorous control of ground vehicle operation, the Board found more recorded vehicle and aircraft collisions for the prior year than at the other airports. Vehicles with cracked windshields and inoperative headlights, and vehicles traveling at excessive speeds in the airport operations area were observed at Los Angeles International.

FAA annual inspections of public protection measures (14 CFR 139.65) at the study airports usually cited problems such as open gates or doors leading to the airport operations area and occasionally identified situations where the airport operations area could be entered by climbing over articles stored near a fence. The Safety Board found some uncertainty among certification inspectors about what an airport should do to insure public protection. One inspector considered a gate that was shut but unlocked to be acceptable, another inspector believed a gate should be locked, and a third inspector indicated that an open unmanned gate would be acceptable if the gate were roped off inside to prevent inadvertent entry. Some of the confusion results from ambiguities in the FAA regulations. Title 14 CFR 139.65, which requires a certificated airport to have "...appropriate safeguards against inadvertent entry of persons or large domestic animals onto any airport operations area," also states that airports complying with 14 CFR Part 107--Airport Security are acceptable under 14 CFR Part 139. But Part 107, which is intended to provide protection against acts of criminal violence and air piracy, requires airport operations area security to prevent "...entry of unauthorized persons and ground vehicles." Apparently, inspectors are not sure whether airport public protection measures should be required to prevent "inadvertent entry" to the airport operations area (14 CFR 139.65) or "...to control penetration of an [airport operations area] by an unauthorized person" (14 CFR 107.23). Also, 14 CFR 139.65 specifically requires safeguards against inadvertent entry of "large domestic animals" to the airport operations area; however, there is no requirement to prevent entry of wild animals, nor is there any definition of a "large domestic animal."

Some of the following situations were indicative of inconsistencies observed in implementing public protection requirements:

- o Dulles International, Chicago O'Hare, and Houston Hobby had deer within airport boundaries and were working to control the problem through varied measures such as hunting, trapping, and electrical fencing;
- o San Diego Lindbergh and Los Angeles International had perimeter fence that were manufactured of wood, and at Los Angeles International the supporting structure was on the outside. Houston Hobby had a 4-foot-high fence; Houston Hobby and Houston Intercontinental had wire fences with large rectangular grid patterns.
- o Houston Hobby had gates that were routinely left open and unattended, with a light nylon rope used to circle an area inside the open gates;
- o Three dogs were seen crossing the active runway at Houston Hobby.

Fuel Storage and Dispensing.--The Safety Board's assessment of the FAA's annual inspection of handling and storage of hazardous articles and materials (14 CFR 139.51) at the study airports was concentrated in two principal areas: the dispensing of aircraft fuel and surveillance of fuel service facilities. Procedures for handling other hazardous materials contained in the airport operations manuals of the study airports were detailed adequately, and no difficulties with procedures were documented during the study.

At all study airports except Dulles International and Burbank-Glendale-Pasadena, the Safety Board saw fueling service discrepancies which included leaking fuel trucks, fuel trucks without fire extinguishers, trucks on which the fuel type was not easily identified, fueling being performed without grounding, and fueling being performed without securing (chocking) the wheels of the truck. A review of FAA annual inspection records for these airports did not show any similar observations by FAA inspectors. Records at one regional office indicated that inspectors were uncertain about what bonding and grounding procedures should be considered acceptable during fueling operations.

Extensive comments on prior inspection reports about fuel handling and storage were found at only one of the regional offices surveyed. While fuel storage inspection is an annual requirement, the Safety Board found that many of the FAA certification inspectors have no experience or formal training in the operation of fuel storage facilities, nor do they have standard guidelines to use during the inspection process. The Board found this apparent lack of surveillance capability to be disturbing. Although National Fire Protection Association (NFPA) 18/ records showed that only one minor fuel storage fire has occurred on an airport, several cases of nonairport storage facility accidents involving similar storage facilities resulted in loss of life and extensive property damage, and illustrated vividly the potential for a significant airport safety problem.

The Safety Board also found that a fundamental disagreement existed between airport operators and the FAA regarding an airport's responsibilities under 14 CFR 139.51(b) which requires that "the airport (or its tenant) as the fueling agent have an adequate number of trained personnel and procedures to safely dispense aviation fuel."

Airport managers said that holding the certificated airport responsible for tenant fueling agent operations is unfair and that adequate surveillance of fueling operations would impose a severe financial burden on the airport. The airport managers further argued that they are not held responsible for the quality of airplane maintenance or flight training of their fixed base operations (FBO) or for certificating those individuals conducting such services and that they did not understand why one segment of an FBO's services (fueling) was being singled out. Many airport managers believed that fuelers should be licensed by the FAA as are pilots and mechanics. Since the responsibility for aviation safety is shared by pilots, mechanics, and fuelers, the FAA should ensure that a minimum level of competency for fuelers is required by instituting a certification program.

The South Chapter of the American Association of Airport Executives (AAAE) in its annual winter meeting at El Paso, Texas, on February 18, 1982, resolved to petition the FAA to change 14 CFR 139.51(b). The AAAE's petition was published in the Federal Register on September 2, 1982, (docket No. 23071) and was denied by the FAA on July 7, 1983. The FAA's position was and remains that the issuance of an airport operating certificate should be dependent on a determination that the entire airport meets the safety requirements of 14 CFR Part 139. The FAA expects the certificate holders to exercise enough control over the tenants to insure that they are conducting a safe operation. The FAA believes that the airports can accomplish this with the contractual (landlord) leverage already available and employed in other aspects of the landlord/tenant relationship. The argument for FAA licensing of fuelers was not addressed.

18/ The National Fire Protection Association was organized in 1896 to promote the science and improve the methods of fire protection and prevention, to obtain and circulate information on these subjects, and to secure the cooperation of its members and the public in establishing proper safeguards against loss of life and property by fire.

The attitude that airport management should not be responsible for fuel management prevailed at several of the airports visited, and the managers at the airports did not have a complete understanding of the training program and/or the operation of the fuel storage facilities of their fuel service tenants. However, because of FAA regional concern with past accidents caused by the use of improper fuel in aircraft, airport managers in the FAA's Southwest Region appeared to be keenly aware of the overall operation of their fuel service facilities. For example, Houston Hobby has 26 fuel service facilities, and airport management seemed to understand each operation. Houston Hobby, unlike 90 percent of the airports visited, has a "fuels specialist" on the airport staff, who requires each fuel service facility to submit a summary of training in fuel handling and a fuel plan for the fuel storage area. Each is reviewed by the fuels specialist and entered in the airport operations manual.

The Safety Board's concern that the FAA's inspection personnel had too limited knowledge of storage facilities led to study team visits of 30 fuel service facilities for the purpose of identifying problems. The facilities surveyed ranged from operations pumping 24,000 gallons a year to operations in which annual fuel usage exceeds 1 billion gallons. Management personnel were interviewed at each facility about:

- o Turnover, hiring, and training of refueling personnel;
- o Mechanical condition of fuel service vehicles;
- o Fuel storage facilities.

At the completion of each interview, the Safety Board visited the fuel storage facility, accompanied by a management representative to answer questions that might arise.

Only two of the facilities visited administered a prehire test for aptitude. Three facilities required potential employees to furnish a certified copy of their State driving record and license. About 75 percent of the fuel service facilities hired people "off the street" for refueling positions. The remaining facilities elevated personnel to a refueling position from within company ranks. Roughly 90 percent of the facilities that hired people "off the street" preferred that the prospective employee have some aviation and/or fueling experience; however, this was not mandatory.

Each facility required a new employee to read company safety, operations, and quality control manuals and attest to having done so by signing a statement. This was the only classroom or self-study training for new refueling employees at 20 percent of the fuel service facilities visited. The remaining 80 percent had tests on refueling procedures and some audiovisual presentations. The larger fuel service facilities (approximately 60 percent of those visited) used written tests and audiovisual presentations made available by the airlines with which they had contracts, and about 20 percent of the facilities produced their own training program tailored specifically to their type of operation.

All of the fuel service facilities incorporated some on-the-job training. Typically a new employee would be assigned to the facility's fueling specialist for such training. On the average, it took about 2 weeks of training before the new employee could begin limited fueling operations on his own. Checkout to "full performance level" was dependent upon the number and type of airplanes serviced by the facility. Each airline has a set procedure which they expect the refueler to know and use, and spot checks are conducted by the airlines to ensure that these procedures are being used.

Managers of all of the fuel service facilities visited said that they reviewed safe airport driving practices with new hires. However, only two of the facilities required the employee to pass a drivers test; one of these facilities was located on an airport that required new airport employees to pass a driving test administered by airport authorities.

Managers of all of the facilities visited said that they reviewed the use of fire extinguishers with new hires as part of the employee's training. However, only five facilities provided new hires with the "hands on" practical use of a fire extinguisher. In these instances the new hires demonstrated their skill at extinguishing a hot fire contained in a 50-gallon drum. Some airports were unable to provide hot fire training for fuel service personnel because of local ordinances prohibiting open air fires.

Only four facilities had some type of recurrent training for refueling personnel, which varied from an oral question-and-answer period to an observation and critique of the refueler's performance.

The majority of the fuel service facilities used old refueling vehicles--in some cases nearly 20 years old--but most of the vehicles appeared to be in good mechanical condition. Managers said that vehicle maintenance was good. All of the facilities required a condition inspection of their refueling vehicles, and nearly every facility required that the vehicle inspection be performed with a company inspection checklist tailored to the refueling vehicles. However, only one facility published a minimum requirement checklist which provided specific guidelines to be used in deciding whether to accept or reject a vehicle.

At most of the facilities a condition check of each refueling vehicle was performed daily, usually prior to the first trip of the day, by a refueler/driver. At three facilities an auto mechanic had the inspection responsibility. At one facility inspections were performed weekly by auto mechanics. Two facilities required inspections prior to each vehicle movement. Several airports also required vehicle inspections. For example, at Denver, the Stapleton International Airport Fire Department inspects refueling vehicles semiannually. At Boston Logan, the Massachusetts Port Authority, in cooperation with the State police, conducts annual safety inspections of refueling vehicles.

Most of the fuel storage facilities at the 14 study airports were old--in some cases over 40 years old--and settling of storage tanks over long periods has resulted in leakage into the ground at some facilities. While not considered a fire or explosion hazard, leakage into the ground is a serious environmental concern. When these facilities were built, they were located in remote sections of the airport. Through the years, both on- and off-airport construction has caused the distance buffer between the storage facilities and highly traversed areas to be diminished greatly. Washington National, Houston Hobby, and Fort Lauderdale-Hollywood are prime examples of this encroachment. Heavily used public roadways lie just a few feet away from the fuel storage facilities on these airports. The existing buffer distance criteria established by the NFPA consider storage facility design and structural integrity to determine buffer distance which range from a few feet to the diameter of a storage tank. Design features which minimize the risk and effects of explosion permit a reduction of the buffer distance.

All of the fuel storage areas were surrounded by chain link fencing, approximately 8 feet high, with the gate secured by a lock. No major or recurring vandalism was reported at any of the facilities.



Spills occurring during aircraft fueling were not considered to be a major problem at any of the airports visited. Although many spills did occur, the airport and fuel facility managers said that the number of spills and gallonage of fuel involved was quite small in proportion to the number of fueling operations performed each day. Fuel spills of five gallons or more were reported at all the study airports. Many study airports required spills of one gallon or more to be reported. The crash-fire-rescue units responded to all reported fuel spills to provide fire protection during cleanup activities. A review of fuel spill incident records at the airports involving aircraft fueling operations revealed that the majority of them were caused by mechanical defects in the aircraft's fuel tank overfill vent valves.

Every fuel storage facility had experienced a fuel spill. In some cases the spill amounted to several thousand gallons. Most of these larger spills were caused either by defective valves or fittings or by the failure of overflow warning devices to alert fueling personnel.

At half of the facilities visited, "Emergency Fuel Shut Off Switches" were not readily identifiable (placarded), and at one storage facility on the north end of Washington National, there was no fire alarm hookup to the airport fire department. Refueling personnel relied on two-way radios in the fueling vehicles to notify the fire department. As a result of the Safety Board's finding, an alarm system has been installed at this storage facility.

The overfill sensing system is designed to protect against the overflow of petroleum distribution tanks during the filling operation. Three types of overfill sensing methods were observed at the storage facilities:

- o Roughly 20 percent of the facilities performed a visual check prior to and after receiving fuel.
- o Approximately 50 percent of the fuel storage facilities had a mechanical float, high-level sensing system. As the fuel rises, the float also is supposed to rise. At a preset height, the float is designed to activate a switch which in turn sets off an aural alarm, thereby alerting the fueling attendant to cease the fueling operation. Several of the fuel service facilities that incorporated mechanical overfill sensors in their storage tanks had no procedure to check their reliability. Several facilities used an additional mechanical float sensor known as the "High High Sensor."
- o The third type of overfill sensing system incorporated either a mechanical or electronic optical sensor. Instead of depending on the fueling attendant to shut down the fueling operation, the sensors performed the shutoff electrically.

About 50 percent of the facilities periodically checked their overfill warning systems. However, nearly all of the fuel service facility managers interviewed indicated that mechanical sensing systems were not very accurate or reliable, and checking the operation of these mechanical systems was difficult or in some cases impossible. For example, one facility the Safety Board visited had a high-level alarm system which was not equipped with a means to check its operation. Fuel spills have occurred at this facility because the mechanical sensing system failed to activate and thus alert personnel to halt the fueling operation. At another facility the mechanical high-level overfill sensor failed its last alarm test.

Overfill hazards and reliability problems have prompted a number of entities to undertake remedial measures. For example, the Department of the Navy has a program to replace mechanical overfill devices with electronic sensors throughout its fuel storage facilities, and Michigan has a State law that requires each terminal having a tank filled by pipeline to be equipped with a high-level alarm system that must be tested every 3 months. In 1980, to eliminate past problems with the old float shutoff in the holding tanks, American Airlines upgraded its New York LaGuardia fuel storage facility by installing optic liquid-leveling sensors to activate an automatic shutoff.

A proposal is currently before the NFPA 30 committee to expand the requirement for high-level alarm systems to include a procedure for checking on a scheduled basis their accuracy and reliability.

Under the Airport and Airway Improvement Act of 1982, the FAA was authorized to continue the allocation of funds for airport development and planning which began under the provisions of the Airport and Airway Development Act of 1970. According to the FAA Office of Airport Planning and Programming, monies from the Airport and Airway Trust Fund cannot be used to upgrade fuel storage facilities unless a storage facility relocation is necessitated by a project that is considered eligible for funding, such as a runway extension. The FAA considers fuel storage facility improvement projects to be the responsibility of the airport.

Crash-Fire-Rescue Capabilities.--The Safety Board's review of FAA annual inspections of crash-fire-rescue equipment and services (14 CFR 139.49 and 139.89) and emergency plans (14 CFR 139.55) for the study airports showed that all airports complied with the requirements of Part 139. The onsite survey of emergency capabilities showed a wide variation in the equipment, resources, and procedures at the study airports. Table 3, a tabulation of crash-fire-rescue indicators at the 14 study airports, groups the airports by a crash-fire-rescue index, which is a means of specifying the requirements for firefighting equipment and extinguishing agents established in 14 CFR 139.49(b). The index applicable to an airport is determined by "the longest large aircraft, operated by an air carrier user, with an average of five or more scheduled departures per day."

The tabulation shows the airports at which the crash-fire-rescue service is also responsible for structural (buildings) fire protection as well as aircraft protection. Also indicated are the total number of firefighting vehicles at each airport and the number of persons assigned to crash-fire-rescue service per operating shift. Title 14 CFR 139.49(h) requires at least three firefighting vehicles for index C, D, and E airports. Chicago Midway met the minimum requirements; all other study airports exceeded the minimum vehicle requirements of the regulation. The average number of vehicles at airports having no structural firefighting responsibility was 5.6, which exceeded minimum requirements by 87 percent. The minimum staffing requirements of 14 CFR 139.49(h) call for: "...sufficiently qualified personnel to insure at least 85 percent of the required maximum agent discharge rate of firefighting equipment." Since most firefighting equipment has a turret system which enables the operator to meet the 85 percent discharge requirements, it is theoretically possible that the regulatory requirement could be met with as few as three people--one person who could drive the vehicle and then operate the turret system for each of the three vehicles. However, the staffing of crash-fire-rescue services at all study airports exceeded this theoretical minimum. Guidance given in a 1967 Advisory Circular AC 150/5210-8 "Aircraft Fire Fighting and

Table 3-- Crash-Fire-Rescue Capabilities and Activities for Study Airports

| Airport Index                     | Airport Identifier | Structural Responsible | Number of Vehicles | Manpower Per Shift | Amount in Gallons or Pounds |      |      |        |              | Yearly Activities |                    |             |
|-----------------------------------|--------------------|------------------------|--------------------|--------------------|-----------------------------|------|------|--------|--------------|-------------------|--------------------|-------------|
|                                   |                    |                        |                    |                    | Water                       | Foam | AFFF | Premix | Dry Chemical | Total             | Aircraft Emergency | Fuel Spills |
| E<br>Aircraft Longer Than 200 ft. | ORD                | Yes                    | 15                 | 52                 | 15,580                      | 0    | 2120 | 0      | 2400         | 503               | 175                | 102         |
|                                   | JFK                | No                     | 7                  | 10                 | 11,250                      | 1296 | 0    | 250    | 1800         | 942               | 421                | 59          |
|                                   | IAD                | Yes                    | 8                  | 15                 | 14,355                      | 500  | 1136 | 0      | 2700         | 723               | 56                 | 25          |
|                                   | BOS                | Yes                    | 5                  | 8                  | 11,660                      | 1621 | 0    | 0      | 1000         | 2034              | 176                | 209         |
|                                   | DEN                | No                     | 8                  | 11                 | 9,000                       | 750  | 860  | 50     | 450          | 697               | 287                | 109         |
| D<br>Aircraft 160-200 ft.         | LAX                | No                     | 6                  | 16                 | 14,000                      | 0    | 2030 | 2000   | 1360         | 817               | 220                | 147         |
|                                   | IAH                | No                     | 9                  | 26                 | 9,050                       | 0    | 1020 | 100    | 3080         | 197               | 66                 | 113         |
|                                   | FLL                | No                     | 4                  | 11                 | 7,500                       | 0    | 1200 | 0      | 1370         | 1955              | 171                | 77          |
|                                   | SAN                | No                     | 4                  | 8                  | 6,000                       | 0    | 1000 | 200    | 500          | 162               | 18                 | 24          |
| C<br>Aircraft 136-160 ft.         | LGA                | No                     | 5                  | 6                  | 7,500                       | 864  | 0    | 125    | 900          | 683               | 239                | 253         |
|                                   | DCA                | Yes                    | 7                  | 13                 | 3,730                       | 0    | 560  | 200    | 1600         | 1001              | 80                 | 21          |
|                                   | MDW                | No                     | 3                  | 8                  | 3,200                       | 300  | 180  | 0      | 700          | 63                | 42                 | 7           |
|                                   | HOU                | No                     | 4                  | 10                 | 5,030                       | 150  | 310  | 0      | 1660         | 141               | 68                 | 70          |
|                                   | BUR                | Yes                    | 6                  | 21                 | 13,500                      | 0    | 1675 | 0      | 700          | 798               | 29                 | 40          |

Rescue Personnel and Personnel Clothing," which was cancelled and not replaced, recommended at least two persons per truck to obtain the desired potential of each type of truck. The lowest staffing level found was six persons per shift at New York La Guardia, which had no structural firefighting responsibility, and the highest staffing, 52 persons per shift, was found at Chicago O'Hare, which did have structural responsibility. The average per shift manpower at study airports with no structural firefighting requirement was 11.7, 290 percent greater than the minimum required.

Part 139 specifies two different minimum water quantity requirements for firefighting. The larger quantity is required if protein foam is used. However, if aqueous film forming foam (AFFF) is substituted for protein foam, the water quantity can be reduced. The Safety Board found that all study airports exceeded their respective water quantity requirements, and all but Denver Stapleton and San Diego Lindbergh exceeded the dry chemical extinguishing agent minimum. Figure 4 shows the water and extinguishing agent quantities available strictly for aircraft crash-fire-rescue purposes; water and agents for structural firefighting were not tabulated. Index E airports exceeded water capacity requirements by 90 percent to 160 percent; and with one exception, airports in this index exceeded dry chemical requirements by more than 100 percent. Index D airports had 88 percent to 225 percent more water than required, and at index C airports the minimum was exceeded by 50 percent to 540 percent. The NFPA and the International Civil Aviation Organization (ICAO), of which the United States is a member, have published guidelines for water and dry chemical agent quantity similar to those of Part 139. ICAO and NFPA quantity recommendations exceed the Part 139 minimum requirements. Beyond the minimal requirements prescribed by Part 139, the FAA, in AC 150/5210-6B--Aircraft Fire and Rescue Facilities and Extinguishing Agents, dated January 26, 1973, also described recommended levels of protection which are comparable to ICAO standards. NFPA, ICAO, FAA Part 139, and FAA AC 150/5210-6B specifications for comparable airport index or category are presented in table 4, where the differences in recommended or required quantities are apparent. The study airports not only exceeded FAA minimum standards for water quantity, they all exceeded the more demanding NFPA guidelines and ICAO member requirements; all except Denver Stapleton and San Diego Lindbergh (one index E and one index D) exceeded the dry chemical levels recommended by ICAO and NFPA.

If the degree to which study airports voluntarily exceeded the minimum requirements for manpower, equipment, and extinguishing agents of Part 139 is typical, then the adequacy of the minimum levels established by the FAA appear to be questionable, especially since the FAA advisory publication recommends higher levels based on research, test data, and experience.

Title 14 CFR 139.49(i) requires that crash-fire-rescue personnel be "...familiar with the operation of the firefighting and rescue equipment and understand the basic principles of firefighting and rescue techniques." The FAA's AC 139.49-1, AC 150/5210-12, and AC 150/5280-1 list several topics for crash-fire-rescue personnel training. However, these AC's are only advisory, and they are subject to interpretation. FAA certification inspectors also are given some guidance in training program evaluation in paragraph 137(c) and (d) of FAA Order 5280.5 which states:

Table 4.--Comparison of extinguishing agent quantities.

| Index or Category |      |      | FAA Part 139                                        | ICAO                | NEPA             |
|-------------------|------|------|-----------------------------------------------------|---------------------|------------------|
| FAA               | ICAO | NEPA | Gallons of water<br>for AFFF                        | Lbs of dry chemical |                  |
| C                 | 7    | 6    | 2,100<br>(3,140)*<br>/ 500 or<br>450/50<br>(1,000)* | 3,200<br>/ 500      | 3,335<br>/ 500   |
| D                 | 8    | 7    | 2,800<br>(4,740)<br>/ 500 or<br>450/50<br>(1,500)*  | 4,800<br>/ 1,000    | 5,000<br>/ 1,000 |
| E                 | 9    | 8    | 4,200<br>(6,350)*<br>/ 500 or<br>450/50<br>(1,500)* | 6,400<br>/ 1,000    | 6,665<br>/ 1,000 |

\*Quantities recommended in FAA Advisory Circular 150/5210-6B

- c. An effective training program to develop and maintain a high level of proficiency would normally include the following:
- (1) Basic training in the use and maintenance of personal fire fighting equipment and vehicles.
  - (2) Tactical training which covers the "how and when" to use various fire extinguishing agents.
  - (3) Deployment of men and equipment to accomplish the rapid control of a fire in order to protect the emergency evacuation procedures and permit rescue operations.
  - (4) First aid training.
  - (5) Live drills. Recurrent training for firemen where each man participates in at least two live burns per year, using protective clothing, hand lines, and the extinguishing agent.
  - (6) Coverage of the airport emergency plan, mutual aid program and the role of the fire fighting personnel in these plans.

- (7) Coverage of the emergency evacuation procedures, the location and operation of emergency exits from the outside for the types of aircraft that serve the airport, the use of rescue tools and forceable entry equipment, and the necessary precautions employed during these operations.
- d. Live drills (fighting practice fires) afford the trainee an opportunity to learn the capabilities and limitations of extinguishing agents, fire suppression systems (pumps, turrets, hose lines, etc.) and protective clothing.

The Safety Board found that all of the study airports had good basic and tactical training programs (items 1 and 2 above), as well as first aid training (item 4). Training programs for deployment of men and equipment (item 3) varied. Some crash-fire-rescue units carried out at least one mock drill per shift where all equipment was dispatched to a vehicle or aircraft parked on a taxiway or inactive runway. Others only deployed equipment in response to a standby call for an actual emergency. Deployment of equipment also could be practiced during live drills (item 5) if the fire pit was accessible from all sides. However, the Safety Board found that access to many of the fire pits was limited and that some airports did not have a fire pit. Most of the study airports had conducted emergency drills (item 6); some alternated full scale drills with table-top simulation exercises on an "every-other-year" basis. Only table-top simulations were conducted at a few airports because managers were concerned that full-scale drills caused local traffic congestion and, in their opinion, wasted manpower.

The Safety Board believes that full-scale exercises of emergency plans usually reveal problems which would not be apparent in a table-top demonstration. For example, the Board's investigation of an accident at Detroit Metropolitan Wayne County Airport on January 11, 1983, 19/ revealed some problems with notification procedures outlined in the emergency plan which had not been fully exercised since September 1978. The airplane involved carried a container of radioactive material (RAM), which fortunately was not breached in the accident. However, none of the effective Federal, company, and local regulations or agreements which outlined airport hazardous material notification procedures were implemented. It was only a coincidence that the airport operations employee overheard a discussion of the RAM shipment and notified an on-scene commander. This type of situation might have been avoided if the airport emergency plan had been subjected periodically to a full-scale exercise. Currently, there is no requirement to exercise the plan; however, guidelines provided for certification inspectors in FAA Order 5280.5 recommend that the emergency plan be exercised annually. The Safety Board found that, in general, FAA inspectors were encouraging the study airports to conduct live drills and full-scale emergency exercises.

The weakest area of training the Safety Board observed was in familiarization with new airplanes. None of the crash-fire-rescue units at the study airports had training diagrams of the DC-9-80, or the Boeing 757 or 767. The study airport crash-fire-rescue personnel indicated that familiarization was accomplished only when a new airplane began serving the airport and that training sessions usually were conducted by maintenance personnel of air carriers using the new equipment. Some crash-fire-rescue units stated that familiarization was difficult unless the new airplane remained at the airport overnight. This aspect of crash-fire-rescue training is very important because it provides

19/ Aircraft Accident Report--"United Airlines Flight 2885, McDonnell-Douglas DC-8 54F, N80530, Detroit, Michigan, January 11, 1983" (NTSB-AAR-83-7).



personnel with vital firefighting and rescue information such as the position and location, mechanism of normal and emergency exits, aircraft cabin configuration, seating arrangements, location and operation of the equipment and service access doors and configuration of fuel and electrical power systems. Although this knowledge can be acquired by studying airplane emergency system diagrams, there is no substitute for periodic familiarization with the airplane.

Although Part 139 rules and FAA Order 5280.5 both contain a requirement for crash-fire-rescue training and provide guidelines for the type of training, FAA inspectors have no uniform standards to use in judging the adequacy of each type of training being conducted at certificated airports. The training variations the Board found at study airports attest to the subjectivity of present criteria.

Title 14 CFR 139.49(h) requires that firefighting and rescue personnel be "appropriately clothed." General guidance for protective clothing appears in three different sections of FAA Order 5280.5. The first reference in paragraph 110(i)(10) says that the certification inspector will determine that protective clothing, such as proximity suits, is available to all firefighters. The second reference, paragraph 143(c)(4), indicates that in accepting a firefighting vehicle purchased under the Airport and Airway Development Program (ADAP), the inspector assures that "... auxiliary equipment and protective clothing is as specified." The third reference in paragraph 154 on protective clothing states, in part:

- a. Entry suits are special suits which may be used in and around flammable liquid fires. These suits, complete with breathing equipment, are impractical due to the excessive dressing time and because many models are too bulky to use successfully.
- b. Proximity clothing, consisting of hoods, coats, trousers and mittens using aluminized fabric outer surfaces have better heat reflection properties than the standard fire fighters turnout clothing and permits closer access to the fire area. . .
- c. Conventional turnouts, used mainly for structural fire fighting, are designed to give substantial protection from cold, heat, water, and falling debris. . .
- d. The clothing most highly recommended for aircraft fire fighting is the proximity suit if worn with the necessary lining.

Although the FAA highly recommends the proximity suit for aircraft firefighting, there is nothing in Part 139 or FAA Order 5280.5 to preclude the use of less effective protective clothing to comply with the rule in 14 CFR 139.49(h). All of the protective clothing observed at the study airports was the aluminized fabric type, although many of the suits differed in construction and in fabric weight. There were no standards available to inspectors for judging the adequacy of various types of proximity suits.

At the study airports the Safety Board found several different methods of recording the activities in which crash-fire-rescue units participated. For example, some airports recorded training deployment and emergency medical service calls, while others did not. Therefore, the crash-fire-rescue activities in table 3 only show yearly totals of all

activities reported by each airport's crash-fire-rescue unit and separate yearly totals of crash-fire-rescue operations in response to aircraft emergencies and to fuel spills. Response to aircraft emergencies and to fuel spills accounted for almost 35 percent of all crash-fire-rescue activities reported. The Board did not attempt to characterize the nature of the remaining activities because of the many different activity reporting schemes being used; however, the remaining 65 percent certainly would include training activities such as equipment deployment or live drills and emergency medical services provided at some airports by crash-fire-rescue units.

#### FAA Regional Program Administration

As the Safety Board staff visits to the seven FAA regional offices and the 14 study airports within the regions progressed, the Board was able to construct a qualitative and quantitative picture of the methods used to administer certification program activities. Interregional annual inspection differences and differences between FAA annual inspection records and the Board's observations already have been documented. In cases where regulations were found to be vague or guidance materials highly subjective, the differences were readily discernible. However, the Board found also that other qualitative factors such as the inspector's professional background and distinct styles of management appeared to influence regional surveillance activities.

The operation and maintenance of the study airports required the attention of personnel with diverse backgrounds and experience in areas such as civil engineering, electrical engineering, firefighting and rescue, public protection and emergency planning, and aircraft operational requirements. Most FAA certification inspectors, in the seven regions visited, had in-depth experience in one of the engineering disciplines, and many were also pilots. The inspectors had to augment their professional qualifications and experience in unfamiliar areas through agency training and on-the-job experience. In each of the regions, the Board observed in annual inspection records of study airports that inspectors naturally tended to emphasize the areas corresponding to their background and experience. To overcome this tendency, five regions recently have established a form of inspection assignment rotation among inspectors. One region temporarily had assigned a new inspector to accompany an experienced inspector in another region as a means of broadening the new inspector's experience and sharpening the skills needed to perform inspections. An annual conference on airport certification was the primary means of exchanging information between regions, and the methods and techniques used successfully in one region were occasionally adopted in other regions as a result of this exchange. Although certification inspectors were able to exchange information with their assigned airports by telephone or written correspondence, many inspectors stated that they were unable to attend airport operation symposiums or meetings sponsored by airports within their region because of travel funding limitations. The inspectors stated that direct participation in these airport forums provides the most effective method of exchanging ideas and views on airport topics of regional concern.

The Safety Board also observed different management styles in the regions which were reflected in the relationship with airport authorities. The styles tended to fall into one of two categories: the cooperative approach in which regional personnel tried to accomplish certification safety objectives through persuasive measures, or the more rigid approach in which the authority to inspect and require changes was firmly exercised. Since the Board staff visits to study airports did not show that deficiencies from previous inspections were allowed to go uncorrected, each approach appeared to be effective in obtaining remedial action for discrepancies found during inspection or surveillance.

activities. All the regions had a system of documenting airport corrective measures which were required, and each system had followup measures to monitor the progress of corrective actions.

Some regional offices appeared to have developed a degree of expertise in certain aspects of airport operations which was acknowledged by other regions surveyed. For example, fuel storage and dispensing expertise was found in one region, crash-fire-rescue expertise in another, and bird hazard reduction expertise in yet another. Regional managers and inspectors believed that the expertise evolved either from the need to deal with a particular problem related to local conditions or geography common to many airports within a region, or from individual inspector expertise or interest in an area such as crash-fire-rescue.

A comparison of airport certification workload at the seven regional offices is presented in appendix A, table X. The workload parameters computed from regional activity and resource data were number of certificated airports per inspector, number of fully certificated airports and limited certificate airports per inspector, the percentage of airport division staff involved in the airport certification program, the percentage of certification inspections performed, the percentage of noncertification inspections (utility airports), and the percentage of violations or legal actions.

The Safety Board found regional variations in the number of certificated airports assigned to inspectors as well as the number of fully certificated airports assigned to each inspector. The number of airports per inspector varied from 15 to 63, with an average of 29.5 for all seven regions. Although an inspection workload, which was well above the seven-region average, existed in the Southern and Great Lakes regions, inspectors did not feel that their certification and surveillance activities were being compromised. Most regional inspectors indicated that a workload of more than 20 to 30 certification inspections annually would allow little time for involvement in airport safety activities, such as utility airport visits, safety seminars dealing with local airport problems, or airport management meetings, that were not related to certification. The Board found that, in general, inspectors were able to perform adequately the onsite portion of the annual inspection in 1 day at airports with limited certificates and 2 or 3 days at airports with full certificates. Most inspectors indicated that an amount of time equal to or greater than the onsite inspection was required to prepare for and follow up on inspections.

Many of the region-to-region differences in the administration of the airport certification program for which justification is not readily apparent, could be reconciled through an organizational unit with the authority to resolve conflicting viewpoints. An organizational entity for airport certification, patterned after existing FAA Aircraft Certification Directorates,<sup>20/</sup> could draw upon regionally dispersed technical expertise to provide the best advice for development and implementation of uniform, detailed regulatory compliance criteria. The FAA's existing Aircraft Certification Directorates perform technical policy management and project management for the aircraft certification programs including type certification, original airworthiness certification, and production certification. In addition, various other regulatory and management

<sup>20/</sup> The term "certification directorate" means an organization formed and staffed for the purpose of managing the various elements of a certification program. Currently established directorates are headed by a regional director who has final authority and responsibility and is ultimately accountable for the certification programs assigned to that directorate.

functions related to certification which had been performed in Washington headquarters have been delegated to the directorates. According to FAA Notice N8100.5 dated February 10, 1982, Aircraft Certification Directorates were established to achieve improvements in consistency of application of airworthiness standards by establishing single-point accountability, and to assure concentrations of technical expertise which are accountable for technical decisions and policy and for improving timeliness of updating regulations, policy, advisory circulars, and other forms of technical guidance. The Transport Airplane Certification Directorate is located in the FAA's Northwest Mountain Region; similarly, the directorates for small aircraft, rotorcraft, and engines are located in the Central Region, Southwest Region, and New England Region, respectively.

The Safety Board solicited comments regarding the airport certification program from the persons involved in implementing the program in the regions. Discussions with regional managers, airport managers, and certification inspectors focused on their perceived need for a change and associated benefits and problems. FAA regional and airport management agreed that the certification program has been most beneficial to airports with lower passenger volume and limited financial resources. Beyond imposing safety standards on airports through the certification requirement, congressional legislation provided that acquisition of safety or security equipment required by Federal regulations could be financed by allocations from the Airport and Airway Trust Fund. By relating funding eligibility to certification requirements, airport and airway legislation assured that certificated airports with severe financial limitations still would have funds available for safety-related projects that otherwise might not be undertaken.

In four of the seven regions, staff said that Part 139's lack of specificity made the certification program difficult to administer. Although two regions preferred the flexibility provided by the present rule, the regional inconsistency in interpreting Part 139, due to the lack of specifics, produced inappropriate variations in facilities and procedures at certificated airports. This situation could be remedied by creating an airport certification directorate to serve as the focal point for technical policy. Specific suggestions and problems related by regional and airport management are set out in appendix B, as well as some past findings of FAA certification program audits.

#### Proposed Changes to 14 CFR Part 139

The FAA convened a public meeting on July 14, 1983, to discuss updating and amending Part 139, in light of its experience with the certification program, as well as Safety Board and industry recommendations, and the results of its own studies. The subjects proposed for discussion by the FAA included emergency plans, snow removal, safety areas, bird hazard management, fueling operations, marking and lighting of runways and taxiways, crash-fire-rescue index requirements, and crash-fire-rescue training.

Many of the changes proposed in each subject area were related directly to past Safety Board recommendations. For example, the proposal made by the FAA to clarify snow removal requirements by providing advisory circular guidance is responsive to Safety Recommendation A-82-152, 21/ which called for upgraded snow removal plans having specific criteria for runway clearing and use. Safety Recommendations A-82-87

21/Issued on December 23, 1982; see Aircraft Accident Report--"World Airways, Inc., Flight 30H, McDonnell Douglas DC-10-30, Boston Logan International Airport, Boston, Massachusetts, January 23, 1982" (NTSB-AAR-82-15).

and -88 22 to improve water rescue capabilities prompted an FAA proposal to require, where needed, water rescue provisions in airport emergency plans. Safety Recommendations A-77-16 and -17 23 on safety area improvements and Safety Recommendations A-76-10 through -12 24 for more systematic bird hazard reduction programs also were addressed by the FAA in the discussion proposals.

The Safety Board is encouraged by the FAA's announced intention to establish standards for aircraft fueling operations and to undertake periodic surveillance to assure adherence to the standards. Since 1967, the Board has issued seven safety recommendations in this area, five of which were directed to the FAA. 25 These recommendations addressed such topics as ramp safety, procedures and practices of fuel handling, color coding around aircraft fuel filler openings, eliminating water from fuel, and expanding 14 CFR Part 139 to include minimum specifications and design criteria for the installation, maintenance, and inspection of aviation fuel storage and dispensing systems at all airports. Two Safety Recommendations were directed to the General Aviation Manufacturers Association (GAMA) in October 1982 26 concerning standardizing and modifying nozzle and tank openings throughout the aviation fuel distribution system. The Board's survey of fuel dispensing at the 14 study airports showed that discrepancies and confusion about inspection requirements and responsibilities still exist. The FAA's proposal for more definitive standards accompanied by periodic surveillance should improve the present situation.

The FAA introduced a proposal to modify the rule governing marking and lighting of runways, thresholds, and taxiways (14 CFR 139.47) which would require rotating beacons as well as marking and lighting consistent with the type of approaches permitted at airports. The existing rule does not require marking and lighting but only requires that any lighting provided on the airport be operable and that markings be in good condition. The proposal, while an improvement over the existing regulation, does not include a requirement for uniformly designed lighting, marking, and guidance signs. FAA advisory circulars and ICAO Annex 14 (International Standards and Recommended Practices--Aerodrome) contain guidelines for marking, lights, and guidance signs which could serve as the basis for a rule intended to require standardized airport visual aids.

The need for uniformity has been described in a January 24, 1984, letter to the Safety Board from the Air Line Pilots Association (ALPA) (refer to appendix C) which cited several examples, from ALPA's safety deficiency reporting system, of pilot confusion and misinterpretation caused by marking and lighting at various airports. Unfortunately, this information in response to the Safety Board's initial request for the identification of safety-related matters to be considered during airport survey visits was received after the visits. Therefore, the study team was not able to observe the specific situations described in the correspondence. However, the Safety Board's continuing investigation of the collision on December 23, 1983, of a Korean Airlines DC-10 cargo

22/ Issued on August 11, 1982; see Aircraft Accident Report--"Air Florida, Inc., Boeing 737-222, N62AF, Collision with 14th Street Bridge, near Washington National Airport, Washington, D.C., January 13, 1982" (NTSB-AAR-82-8).

23/ Issued on April 20, 1977; Aircraft Accident Report--"Texas International Airlines Flight 987, McDonnell Douglas DC-9-14, Stapleton International Airport, Denver, Colorado, November 16, 1976" (NTSB-AAR-77-10).

24/ Issued on March 8, 1976; Aircraft Accident Report--"Overseas National Airways Flight 032, McDonnell Douglas DC-10-30, John F. Kennedy International Airport, Jamaica, New York, November 12, 1975" (NTSB-AAR-76-19).

25/ A-67-9; A-70-50; and A-81-9, -10, and -11.

26/ A-82-140 and -141.

airplane and a Piper Chieftain commuter airplane on runway 6L/24R at Anchorage International Airport has revealed that the pilot of the DC-10, in conditions of poor visibility, entered the wrong runway and attempted to take off. The pilot stated that he did not see a runway intersection sign which would have identified the runway he was about to enter; this case and others described in appendix C appear to support a requirement for improved and standardized lighting, marking, and guidance signs to minimize confusion and enhance readability of markers and signs.

The FAA also has proposed specific standards for training requirements such as those recommended by the NFPA, which should eliminate some of the variations in crash-fire-rescue training observed at the study airports. The State of Georgia has enacted legislation to require firefighters to successfully complete training in accordance with NFPA Standards 1001 and 1003. These standards specify a method to evaluate a training curriculum for crash-fire-rescue training. The Georgia program is viewed by some as a prototype which could be used as a model for other programs. However, an FAA official observed that it is impractical and inequitable to impose "across the board" training requirements on both large and small airports. Although some differences in the training syllabus for crash-fire-rescue personnel would seem to be appropriate at larger (index C, D, and E) and smaller (index A and B) airports, the Safety Board believes that 14 CFR Part 139 must specify a minimum acceptable level of training for all certificated airports. Crash-fire-rescue personnel should be equally well prepared at all airports to handle aircraft emergencies.

The most controversial proposal introduced by the FAA at the public meeting called for lowering crash-fire-rescue vehicle requirements at index B airports from two vehicles to one, and substituting an unspecified level of crash-fire-rescue protection, which would be established in individual negotiations between the FAA and airports, for the present index A minimum requirements of one vehicle with a 3-minute response time. This proposal emanated from an FAA-commissioned study 27/ of crash-fire-rescue costs and benefits, which recommended eliminating crash-fire-rescue requirements at lower index airports because of low benefits accrued in proportion to costs. The FAA has received comments from organizations such as the NFPA and ALPA critical of the study methods and findings. The Safety Board is concerned that this proposal could lead to a safety reduction at lower indexed airports, which account for more than half of all the certificated airports and enplane about 3 percent of all passengers each year. Theoretically, under existing regulations and the proposal advanced for discussion, large jet transport aircraft could average four departures per day at index A or B airports and be virtually unprotected by crash-fire-rescue equipment. The Board views with concern any reduction in crash-fire-rescue capability and intends to carefully review any proposed rule change in this regard at such time as an NPRM to amend Part 139 is issued.

## AIRPORT PHYSICAL LIMITATIONS

### Accidents

The tragic consequences of the Air Florida accident near Washington National, the World Airways accident at Boston, and the Pan American accident at Kenner, Louisiana, brought forth renewed expressions of concern for the safety of people residing, working, or traveling near airports, as well as for the safety of air travelers. The adequacy of

27/ "Airport Crash, Fire, and Rescue: Policy Alternatives Suitable for Further Analysis," H. H. Aerospace Design Co., May 1982, DOT/FAA/AS/82-1.



airport safety margins has been questioned, especially at older, smaller airports originally designed and built to serve airplanes powered by reciprocating engines, which typically required less runway length than the first generation of commercial turbojet airplanes. The Safety Board analyzed aircraft accidents and incidents in which airport physical limitations may have been involved to assess the significance of such limitations. Several of the 14 study airports were selected because they provided an opportunity to observe various physical constraints imposed by topographical features or community growth and their influence on operations at the airport.

The Safety Board's aircraft accident data system was used to obtain information on three selected types of accidents and incidents involving air carrier (Part 121) operators which occurred from 1964 to 1981. The types of accidents chosen for analysis were undershoots, 28/ overshoots, 29/ and veer offs, 30/ all of which involve encroachment of aircraft on areas adjacent to runways. Undershoot, overshoot, and veer off accidents were characterized for 9-year intervals (1964-1972 and 1973-1981) before and after airports were certificated. (See appendix A, tables XI, XII, and XIII.) As the Safety Board found in the case of all types of air carrier accidents (appendix A, table IV), the number of air carrier undershoot, overshoot, and veer off accidents decreased substantially in the postcertification period (1973 through 1981). The accident rates (number of accidents occurring in the United States per million air carrier operations) in the 1973 through 1981 period decreased from the rates of the prior 9 years by about 60 percent for undershoots, by 51 percent for overshoots, and by 66 percent for veer offs. In relation to all air carrier accidents which occurred in the United States for the 1973 through 1981 period, undershoots accounted for 2.4 percent, overshoots for 3.2 percent, and veer offs for 3.6 percent. Almost 10 percent of the air carrier accidents from 1973 through 1981 either involved or could have involved aircraft encroachment on areas adjacent to runways. Twenty out of 29 undershoots and overshoots in the postcertification period involved substantial damage, and two of the overshoots and two of the undershoots resulted in fatalities.

Undershoot, overshoot, and veer off accidents involving air carrier (Part 121) operators also were grouped by year and by length of the runway where the event occurred. (See appendix A, tables XIV, XV, and XVI.) Overshoots were concentrated in the runway length categories under 8,000 feet; the number of overshoots on runways less than 8,000 feet long decreased from 23 in the precertification period (1964 through 1972) to 13 in the postcertification period (1973-1981). Encouragingly, in the recent years from 1978 through 1981, only three air carrier overshoot accidents have occurred, all on runways shorter than 6,000 feet, and no overshoot accidents happened on longer runways.

Undershoot accidents in the pre- and postcertification periods were most frequently associated with the 7,000- to 8,000-foot runway length range. In the precertification period, nine undershoots occurred on approach to runways between 7,000 and 8,000 feet long; four such accidents occurred in the postcertification period. Veer off accidents

28/ Undershoot--Landing or making contact with ground or object short of the runway or other intended landing area. On VFR (visual flight rules) approaches, any contact or landing short of the runway or intended landing area while on final is coded as undershoot. On IFR (instrument flight rules) approaches, an undershoot is coded only if the field or intended landing area was in sight before contact or landing shaft.

29/ Overshoot--Landing too fast or too far down the runway or other intended landing area, resulting in: (a) running off the end of the landing area, including collisions which may result; (b) ground looping, nosing down, or overturning off runway or intended landing area; (c) landing beyond the intended landing area.

30/ Veer off--Loss of directional control or sudden swerve while taxiing, taking off, or landing.

between 1964 and 1981 occurred most frequently on runways longer than 10,000 feet. For example, 15 veer off accidents occurred on runways longer than 10,000 feet from 1964 through 1972, and 8 veer off accidents occurred on runways longer than 10,000 feet from 1973 through 1981.

The Safety Board also examined the most severe encroachment accident cases, in which the aircraft was destroyed (see appendix A, table XVII) to determine if any patterns existed. Between 1964 and 1981, in cases where aircraft destruction occurred, 64 percent involved the striking of an obstacle on the ground, 73 percent were undershoots, 20 percent were overshoots, 73 percent involved turbojet aircraft, and 47 percent occurred when some form of precipitation was present.

Runway length, one of the primary indicators of physical airport constraints, appeared to have little direct relationship to the occurrence of undershoots. Factors such as the presence of some form of precipitation and availability of flight path guidance were of more significance in undershoot accidents. However, as expected, overshoots were related to runway length as well as weather conditions conducive to degrading the runway surface stopping capability. As indicated in table XVIII of appendix A, 74 percent of the air carrier overshoot accidents involving narrow-bodied, two- or three-engine turbojets between 1964 and 1981 occurred on runways shorter than 8,000 feet, and table XII shows that about half of all air carrier overshoots between 1964 and 1981 occurred in inclement weather (rain, sleet, or snow). Safety Board records also show that flightcrew operational errors were cited in nearly all encroachment accidents where causal or contributing factors were assigned. Although it is more likely that overshoots will occur on shorter runways, the Safety Board found that 11 percent of the narrow-bodied, two- or three-engine turbojet overshoots occurred on runways that were 9,000 feet or longer.

In the Safety Board's special investigation report of operations on contaminated runways, 31/ the Board discussed the runway length safety margins provided by existing FAA certification and operational standards and concluded that the FAA should adopt rules which will provide adequate runway length safety margins in relation to existing conditions. Increasing the runway length required for operations from contaminated surfaces, which could result in the need to reduce airplane operating weight at airports with shorter runways in order to avoid exceeding the runway length available, is one method of compensating for degraded stopping capability and reducing the potential for an overrun.

On December 23, 1982, the Safety Board issued 18 Safety Recommendations as a result of its investigation of the World Airways DC-10 accident at Boston-Logan and the special investigation of operations on contaminated runways. Three of these recommendations, A-82-163, -164, and -165, are germane to the topic of improving safety margins through revision of certification and operational rules:

Amend 14 CFR 25.107, 25.111, and 25.113 to require that manufacturers of transport category airplanes provide sufficient data for operators to determine the lowest decision speed ( $V_1$ ) for airplane takeoff weight, ambient conditions, and departure runway length which will comply with existing takeoff criteria in the event of an engine power loss at or after reaching  $V_1$ . (A-82-163)

31/ Special Investigation Report--"Large Airplane Operation on Contaminated Runways" (NTSB-SIR-83-2).

Amend 14 CFR 135.199 and 14 CFR 135.379 to require that operators of turbine engine-powered, large transport category airplanes provide flightcrews with data from which the lowest  $V_1$  speed complying with specified takeoff criteria can be computed. (A-82-164)

Amend 14 CFR 25.109 and 14 CFR 25.125 to require that manufacturers of transport category airplanes provide data extrapolated from demonstrated dry runway performance regarding the stopping performance of the airplane on surfaces having low friction coefficients representative of wet and icy runways, and assure that such data give proper consideration to pilot reaction times and brake antiskid control system performance. (A-82-165)

In letters to the Safety Board dated April 1, 1983, and September 20, 1983, the FAA responded to all 18 recommendations. With respect to A-82-163 through -165, the FAA indicated that the recommended revisions would be considered by a Joint Aviation/Industry Landing and Performance Task Group. While the Board agrees with this approach, it is concerned that the FAA's actions may not necessarily lead to implementation of these recommendations. Therefore, in a letter dated December 12, 1983, the Board has asked for added assurance that the task group has a clear mandate "... which will result in a requirement to provide to pilots the takeoff and landing performance data referred to in Safety Recommendations A-82-163 through -165. We continue to believe that the subject performance data could be developed for the current fleet of transport aircraft without significant resource expenditures..." These recommendations have been classified as "Open—Unacceptable Action" while the Board awaits further FAA action.

The December 14, 1983, letter to the FAA also reemphasized the Safety Board's longstanding support for improving operating safety margins at air carrier airports through the installation of runway distance markers. Runway distance markers would show the distance from the marker to the end of the runway, in the direction of operation. On January 3, 1972, the Safety Board issued Safety Recommendation A-72-3 which called upon the FAA to: "Require the installation of runway distance markers at all airports where air carrier aircraft are authorized to operate." The FAA did not implement this recommendation because it believed that potential operational problems associated with distance markers, such as the possibility of misreading a distance or the need to divert a crewmember's attention from monitoring flight instruments in order to monitor markers, made their value questionable. The FAA's reply was classified as unacceptable, and the recommendation was reiterated as a result of the Air Florida crash near National Airport and again after the World Airways DC-10 accident at Boston. Although the distance marker system should not be construed as a substitute for developing a reliable cockpit acceleration monitoring system, the Safety Board believes that distance markers would provide flightcrews with an interim means of assessing takeoff performance. It also would provide to flightcrews, on landing, a way of quickly ascertaining the amount of remaining runway and enable them to use the most effective braking techniques for the situation. We await a response from the FAA describing their current views concerning runway distance markers.

### Runway-Related Safety Measures

Although adequate runway length safety margins for contaminated runway conditions would reduce overrun possibilities, the Safety Board's survey of encroachment accidents also showed that overruns have occurred on runways of 9,000 feet or longer and that undershoots may occur on any length runway. Therefore, the Safety Board investigated other measures, such as safety areas and frangible structures, which can mitigate the consequences of encroachment-type accidents.

**Runway Safety Areas.**—Originally, 14 CFR 139.45 contained dimensional specifications for runway safety areas which required the area to be 400 feet wide and to extend 200 feet beyond each end of a runway. The rule also required that the safety areas be "delethalized" by appropriate clearing, drainage, and surface preparation, as well as by frangibly mounting necessary equipment support structures. In 1974, the FAA amended Part 139 and deleted specific dimensions for safety areas, giving the following explanation:

The proposal in the Notice to delete references to specific dimensions was made by the FAA in recognition of the difficulties attendant to prescribing specific standards to meet the situations found at the many airports which predated Part 139. Those standards have proven to be impracticable and unsuited to broad application. The FAA acknowledges that in particular situations the applicable FAA criteria in effect at the time of construction may not have required the runway safety area to extend a distance of 200 feet beyond the runway end. However, program experience indicates that in many cases compliance with the 200-foot requirement is practically or economically infeasible. . . .

In effect, a "grandfather clause" allowed the area adjacent to usable runways, which conformed with FAA criteria in effect at the time the runways were constructed, to be accepted as safety areas under Part 139. However, in AC 150/5335-4--Airport Design Standards - Airports served by Air Carriers - Runway Geometrics, dated January 3, 1977, the FAA provided the following guidelines for the design of safety areas and extended safety areas:

- c. The width of the runway safety area should be at least 500 feet. . . .
  - d. The runway safety area length is 400 feet (120 m) longer than the runway, extending 200 feet (60 m) beyond each runway end. For a runway with a stopway over 200 feet (60 m) in length, the runway safety area should extend to the end of the stopway.
- \* \* \* \* \*
- a. The extended runway safety area is a rectangular area centered on the extended runway centerline. It begins at the end of the runway safety area and extends 800 feet (240 m) to a point 1,000 feet (300 m) from the runway end. Its width is the same as the runway safety area. . . .

The latest FAA design standard for transport airports, AC 150/5300-12, dated February 28, 1983, specifies that a runway safety area should be at least 500 feet wide and should extend 1,000 feet beyond each runway end. There is no longer a distinction made between safety areas and extended safety areas. At the FAA's public meeting held on July 14, 1983, to discuss "... areas of concern and development pertaining to the Airport Certification Program . . .", the FAA introduced a proposal which would require the upgrading of runway safety areas to current, applicable design standards anytime a runway is extended.

During the study, the Safety Board was provided the following results of a safety area survey performed by the FAA in October and November 1981 for all airports which were certificated at the time:

|                                                                                                             |                                      |
|-------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Number of airports in survey:                                                                               | 670                                  |
| Number of runways used by air carriers:                                                                     | 1,263 (represents 2,526 runway ends) |
| Number of runway ends with 1,000-foot safety areas of proper width:                                         | 618                                  |
| Number of runway ends with 200-foot to 1,000-foot safety areas of proper width:                             | 1,198                                |
| Number of runway ends with safety areas less than 200 feet beyond runway end and/or less than 300 feet wide | 710                                  |

In visits to the 14 study airports, the Safety Board staff found that the dimensions of safety areas were generally acceptable in the areas along the sides of the runways. At the constrained airports, such as New York LaGuardia, Chicago Midway, Burbank-Glendale-Pasadena, San Diego Lindbergh, Houston Hobby, Boston Logan, and Washington National, the safety areas at the ends of the runways were marginal or nonexistent, and there were no extended runway safety areas at these airports. There were extended runway safety areas at many of the larger airports, but even at the larger airports some safety areas were smaller in size than recommended by FAA design guidelines of AC 150/5335-4. However, because of the length of the runways at these airports, an extra margin normally is available to prevent an overrun.

The continual problem of encroachment on airports by the surrounding community, which is the result of geographical barriers and conflicting interests and improper land use planning, renders unlikely any substantial increase in the size of runway end safety areas at most airports. However, at Boston Logan the Safety Board was introduced to a possible alternative to extended runway safety areas--a unique plan which analyzed the feasibility of constructing inclined safety areas (ISA) gradually sloping downward at the ends of runways bordered by water. The concept, as described by the airport engineer and shown in a scale model (see figure 3), provides a transitional surface from the runway elevation to the water surface. The ISA would be surfaced with loose gravel or crushed stone, which provides more effective and safe arresting of aircraft than a conventional safety area. The use of an adaptation of the ISA at airports with limited hard-surface safety areas could significantly improve aircraft stopping capability in these areas, without having to increase their size. This concept, based on research into aircraft arresting with

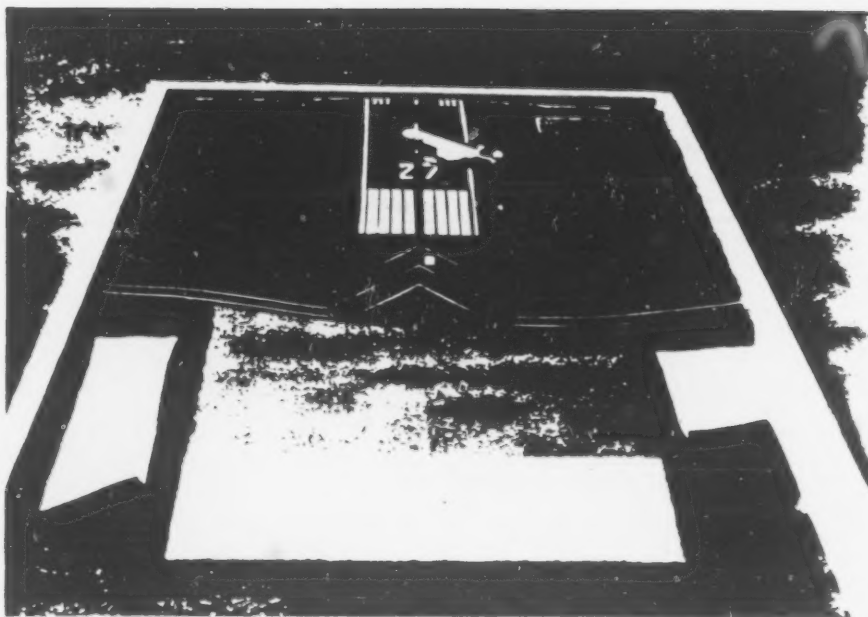


Figure 3-- Inclined safety area (ISA) scale model



gravel surface performed by the Royal Aircraft Establishment, Farnborough, England, 32/ merits further consideration by the FAA.

Use of a portion of the available runway length could in some cases provide overrun protection at airports where fixed boundaries make extending a runway safety area to a length of 1,000 feet a practical impossibility. A 1,000-foot runway safety area could be provided by reducing the length of the available runway by the amount necessary to provide a 1,000-foot safety area. Of course, reducing the available runway length to achieve a 1,000-foot runway safety area in the direction of airplane operation would impose takeoff and landing weight penalties at airports with marginal safety areas and short runways. The magnitude of the weight penalty at a given airport for a particular model airplane will depend upon factors such as atmospheric conditions, airplane configuration, and discretionary margins provided by individual air carrier operators. As an example, the weight reduction for a 727-200 airplane was evaluated using performance data from the FAA-approved airplane flight manual for conditions representative of takeoff and landing on runway 18/36 of Washington National. Reducing available runway length to obtain a 1,000-foot runway safety area would result in takeoff weight reductions of 10 to 14 percent of the carrying capacity (passengers, cargo, and fuel) for the following conditions: flaps 25°, zero wind, standard day (59° F, 29.92 in Hg), and hot day (91° F, 29.92 in Hg). No landing weight penalty would result from field length reduction to achieve the 1,000-foot runway safety area because the reduced length would still exceed the length required to land at the maximum landing gross weight listed in the 727-200 airplane flight manual for the following conditions: flaps 30°, zero wind, nose brakes off, mark II anti-skid on, in both dry and wet runway conditions.

The Safety Board also examined the type of mounting used for equipment which, of necessity, is located in a safety area at the study airports. Fifty percent of the airports visited had at least one approach aid mounted on a nonfrangible stanchion. Several of the airports had multiple approach light systems that were nonfrangible. For example, New York LaGuardia and Chicago O'Hare have three and six approach light systems, respectively, that are mounted on nonfrangible stanchions.

All of the airways facilities personnel at the airports visited indicated support for the use of frangible structures. Some airports, however, cannot readily incorporate frangible structures. New York LaGuardia, for example, is geographically bordered by water along several runway approach corridors which precludes the use of frangible approach light structures according to the FAA's program manager for low impact resistance structures (LIRS). He states that difficulties associated with designing frangible support structures for use in water are so complex that design criteria have not been developed by the FAA or the ICAO. In present water installations, approach light bars are attached to the submerged support structures with frangible fittings, but the

32/ R.A.E. Technical Report 68032, February 1968, Soft-Ground Arresting of Civil Aircraft; R.A.E. Technical Report 69001, January 1969, Soft-Ground Arresting of Civil Aircraft--Influence of Gravel Depth and Tire Inflation Pressure; R.A.E. Technical Report 71015, February 1971, Soft-Ground Arresting Civil Aircraft--Scaled Model VC10 Tests in Gravel and Sintered Fuel Ash Pellets.

support structures are not frangible. Factors which complicate attempts to design submerged support structures meeting low impact resistance criteria <sup>33/</sup> include wave frequency and characteristics, ice pressure, and water depth variations caused by tides. It is a clear that it will be a difficult task to develop design criteria for support structures strong enough to withstand the effects of water-related forces yet having low impact resistance, but additional research to resolve the problem certainly merits consideration. Other airports are unable to pursue the installation of frangible approach aid structures as actively as they would like because of workload and manpower constraints. Airway facilities personnel at Houston Hobby, for example, indicated their desire to upgrade runway 14's navigational aids system with frangible stanchions. However, because of their current workload, they do not contemplate upgrading the system in the near future.

Since the inclusion of navigational aids as a funding-eligible item of airport development under the Airport and Airway Development Act of 1970, FAA criteria for the installation of approach light systems have stipulated the use of frangible structures. Construction using these criteria has been accomplished under this program since 1973 at numerous locations. Because of resources and other demands placed upon the FAA, it has been unable to complete the Approach Light System (ALS) program in the 3- to 5-year timeframe that was recommended by the Safety Board in 1977. At the present time, it appears that completion of the ALS retrofit program is still several years away.

In addition to the ALS frangibility program, the FAA has, in the past several years, implemented a program to upgrade the ILS approach systems with frangible localizer structures. Airways facility staff at FAA headquarters indicated that after fiscal year 1983, 187 of the approximately 268 localizer structures in the United States will be mounted so as to be frangible.

**Obstructions.**—Natural and man-made objects may have a significant effect on air navigation and aircraft maneuvering, particularly during landing and takeoff operations. An airport which initially may have few limitations can become limited severely in its operations as man-made objects encroach upon the boundaries, or as natural objects, such as trees, grow in areas where aircraft approach or depart the airport. Title 14 CFR 139.61 states that the airport operator is responsible for insuring that obstructions within the confines of the airport boundaries are clearly marked and lighted. The regulation does not address objects outside the airport boundaries which have been determined to be obstructions.

The President's Airport Commission in 1952 emphasized the need for States to enact appropriate legislation to protect the nation's airports from encroachment. The commission pointed out that land use below the approach and departure paths to the airports should avoid intruding on aircraft use of the airspace. Review of the present and past circumstances has disclosed that encroachment on airport boundaries continues and the 1952 recommendations have been ignored.

<sup>33/</sup> The criteria stated in "Structural/Mechanical Design Criteria for Low Impact Resistant Supports (LIRS)," FAA Report No. FAA-RD-81-28, are:

**Low Impact Resistance Structure (LIRS):** shall be designed to withstand the static and operational/survival winds/jet blasts loads with a suitable factor of safety but fail readily when subjected to the sudden collision forces of 6,000 pound light weight aircraft traveling at 75 knots. The "break-away" mechanisms (joints, etc.) of the structures shall be designed to separate at a peak force no higher than 5,700 pounds acting for approximately 8 milliseconds (0.008 seconds) and absorbing no more than 700 foot pounds of energy (700 ft. lbs.). The resulting damage to the aircraft shall not be serious enough to impair a safe landing.

Title 14 CFR Part 77, Obstruction of Navigable Airspace, provides the rules and guidance regarding identification and study of potential obstructions on and off airport property. Part 77 applies to, "Any object of natural growth, terrain, or permanent or temporary construction or alteration, including equipment or materials used therein, and apparatus of a permanent or temporary character. . . ." Not only do the standards of this rule apply to navigable airspace, but they also apply to the effect construction or alteration has on the operation of an airport. Additionally, 14 CFR 77.25, "Civil airport imaginary surfaces," sets forth the dimensional standards for pathways to the airport associated with the runways. The size of these imaginary surfaces is based on the type of instrument approach available or planned for each runway. The amount of slope and the dimensions of the approach surface are determined by the precision of the approach aid for that runway. It should be pointed out that the imaginary surfaces established by Part 77 were designed as screening or planning standards to be used only for identifying objects which may adversely affect air navigation. The regulation provides the FAA with the opportunity to take appropriate action in modifying flight procedures if the obstruction interferes with air navigation, but the FAA has not been provided with statutory authority to abate obstructions. However, the FAA does have the statutory authority under paragraphs 606 and 307 of the FAA Act of 1958 to inspect, classify, rate, and prohibit the use of unsafe public use airports.

It is the FAA's policy to emphasize the necessity to conserve the navigable airspace and to protect the air navigation facilities from encroachments whenever conflicts of interest arise over the use of the airspace. The FAA desires to satisfy both the interests of the local community and the national interest in providing safe navigable airspace. When proposed construction or alteration of a structure will create an encroachment, the FAA first considers modification of the proposal; but if an existing obstruction is involved, consideration first is given to modifying affected aeronautical operations. Presumptively, any object not meeting the standards of Subpart C of Part 77 is considered to be an obstruction and therefore to affect adversely the safe and efficient use of the navigable airspace. Any finding that the structure is not obstructive must be based on an aeronautical study by the FAA, unless the obstruction is situated within others in a previously designated area, such as an antenna farm.

The issues of land use and obstructive structures are complex matters involving conflicting interests. It is obvious that airport operators cannot exercise direct control over obstructions off the airport. Although Part 77 requires that the FAA be notified of proposed construction which might affect the airspace around an airport, the need for the FAA to use a criminal procedure to enforce this provision is a serious limitation. This topic was discussed in an FAA review in 1972 of the need "... to strengthen the agency's regulations and their application to all towers and other tall structures." 34/ The FAA decided that it would be beneficial to seek a change in the FAA Act of 1958 to permit a levy of a civil penalty in a case where a sponsor fails to give notice of construction as required by Part 77, rather than the criminal penalty in the Act. However, no known further action has been taken or is contemplated to change the law.

Since no Federal law prohibits local governing bodies from approving structures that can result in obstructions in navigable airspace, efforts by the FAA to control and limit the number of these hazards can be thwarted. In order to carry out its responsibilities in this area, the FAA must rely on State and local government cooperation, cooperation

34/ FAA memorandum dated March 13, 1972, From: General Counsel, To: AT-1, Subject: "12-13 January 1972 Director's Conference; Action and Decision Items; OA-2 letter dated 20 January 1972."

of sponsors of new construction, and persuasion. There appears to be good cooperation from government entities based on the record of new obstruction evaluation cases studied by the FAA in 1982. Similarly, cases based on analysis of existing airport airspace obstructions seem to have been negotiated with some success based on the 4-year record from 1979 through 1982. For example, 14,689 obstruction cases were studied in 1982, and 845 obstructions were found to be hazards. Through negotiation to relocate or lower proposed structures, the number of hazard determinations was reduced from 845 to 33. Discussions with the FAA on this point disclosed that the building of a structure classified as a hazard would be a rare exception rather than the rule; as far as the FAA knows, none of the 33 proposed structures which were determined to be hazards were ever constructed.

The Federal Communications Commission's (FCC) cooperation also has been significant in preventing the construction of numerous antenna towers that would have been obstructions to air navigation. However, the FCC does have the authority to reverse the FAA's hazard determinations.

The primary effect of obstructions is to limit the usefulness of an airport, particularly in certain weather conditions. To insure safe clearance of obstructions near airports, approach procedures may have to incorporate more restrictive minimums, runway thresholds may have to be displaced, or obstacles may have to be removed. To assess the effect of obstructions at the 14 study airports (see table 5), the Safety Board looked at threshold displacements and the slopes of geometric imaginary surfaces (planes) described in 14 CFR 77.25 which are used to identify potential hazards.<sup>35/</sup> The Board found that there was a 7-percent reduction in total effective runway length at the study airports which was caused by threshold displacements needed to insure obstacle clearance. The airports plagued with the most close-in obstructions near the end of a runway and the steepest obstruction clearance slopes were Chicago Midway, San Diego Lindbergh, Burbank-Glendale-Pasadena, Boston Logan, and Ft. Lauderdale-Hollywood. Because of the number of variables involved in the determination of instrument approach procedure landing minimums, such as the type of navigation and approach lighting equipment and the performance of the equipment as well as terrain features and obstacles, the Board made no attempt to correlate the effect of obstructions with weather-related landing minima at the study airports.

Sharply different points of view regarding the suitability of Part 77 imaginary surface criteria were expressed to the Safety Board. A few certification inspectors and some airport managers believed that the existing slope and dimensional standards for imaginary surfaces were too restrictive and should be relaxed. However, in a letter dated January 24, 1984 (refer to appendix C), ALPA, expressed the view that Part 77 was not strict enough because it did not contain criteria for evaluating objects encountered on departure. Evaluating the suitability of Part 77 dimensional standards for screening and identifying potential hazards to aircraft approach and departure paths is a complex task which exceeded the scope of this safety study. However, the Safety Board believes that the FAA should study and resolve the concerns and arguments advanced with respect to Part 77.

<sup>35/</sup> The surfaces described in 14 CFR 77.25, "Civil airport imaginary surfaces," are illustrated in figure 6-30 of FAA Order 7400.2B.

Table 2.--Runway threshold displacement and obstacle clearance parameters.

| Airport<br>(rank by<br>longest<br>runway) | No. of<br>runways | Total<br>lengths | Total<br>length displaced<br>threshold | Total<br>effective<br>runway<br>lengths |
|-------------------------------------------|-------------------|------------------|----------------------------------------|-----------------------------------------|
| Ft. Lauderdale (9)                        | 3                 | 20,292           | 1,889                                  | 18,403                                  |
| Kennedy (1)                               | 5                 | 46,884           | 10,983*                                | 35,901                                  |
| New York LaGuardia (11)                   | 3                 | 16,000           | 175                                    | 15,825                                  |
| Chicago O'Hare (5)                        | 6                 | 43,131           | 0                                      | 43,131                                  |
| Chicago Midway (14)                       | 4                 | 23,208           | 3,949                                  | 19,259                                  |
| Los Angeles (2)                           | 4                 | 43,301           | 2,204                                  | 41,097                                  |
| Burbank (12)                              | 2                 | 12,976           | 1,537                                  | 11,439                                  |
| San Diego Lindbergh (3)                   | 2                 | 13,838           | 3,463                                  | 10,375                                  |
| Denver Stapleton (4)                      | 5                 | 46,294           | 1,238                                  | 45,056                                  |
| Houston Intercont. (3)                    | 4                 | 25,954           | 1,030                                  | 24,924                                  |
| Houston Hobby (10)                        | 4                 | 29,422           | 0                                      | 29,422                                  |
| Boston Logan (7)                          | 4                 | 27,418           | 2,859                                  | 24,559                                  |
| Washington National (13)                  | 3                 | 16,936           | 0                                      | 16,936                                  |
| Dulles (6)                                | 5                 | 36,082           | 0                                      | 36,082                                  |
|                                           |                   | 401,736          | 29,327                                 | 372,413                                 |

| Airport             | No. of 50:1<br>slopes | Average obstruction<br>clearance slope | No. close-in<br>obstructions |
|---------------------|-----------------------|----------------------------------------|------------------------------|
| Ft. Lauderdale      | 2                     | 31:1                                   | 0                            |
| Kennedy             | 5                     | 36:1                                   | 2                            |
| New York LaGuardia  | 3                     | 33:1                                   | 2                            |
| Chicago O'Hare      | 7                     | 44:1                                   | 1                            |
| Chicago Midway      | 0                     | 0:1                                    | 8                            |
| Los Angeles         | 3                     | 35:1                                   | 1                            |
| Burbank             | 0                     | 2:1                                    | 3                            |
| San Diego Lindbergh | 0                     | 13:1                                   | 4                            |
| Denver Stapleton    | 6                     | 45:1                                   | 0                            |
| Houston Intercont.  | 2                     | 28:1                                   | 2                            |
| Houston Hobby       | 6                     | 46:1                                   | 0                            |
| Boston Logan        | 2                     | 21:1                                   | 0                            |
| Washington National | 1                     | 26:1                                   | 2                            |
| Dulles              | 4                     | 39:1                                   | 0                            |

\*Note: Many of the displacements are for noise abatement.

Source of data: FAA Master Record 5010-1.

Although the Safety Board's study was confined to certificated air carrier airports, the review of airport obstruction information indicated that a more serious problem may exist at smaller, utility airports. In 1975, two accidents at such airports in which aircraft struck trees during night landing approaches prompted the Safety Board to issue Safety Recommendations A-75-81 and -82 on November 6, 1975, calling for identification of significant obstructions at public-use airports and the dissemination of such information to pilots. The airports that have precision and nonprecision instrument approaches have an increased degree of protection from obstacles and obstructions because of the approach surface standards that must be considered in approving the installation of these types of approach procedures. Utility airports that do not have instrument approach procedures to their runways do not have as high a degree of protection. The approach surface for these visual approach runways is at a slope of 20:1 instead of the 50:1 slope for instrument runways.

In response to Safety Recommendations A-75-81 and -82, the FAA instituted the Airport Safety Data Program in 1981. Under this program, governed by FAA Order 5010.4, the inspection of public-use airports, through increased participation of State aviation organizations and private contractors, has improved collection and publication of airport obstruction data. However, a Safety Board review of the obstruction data provided in the FAA's Airport/Facility Directory (AFD) found it to be of limited value for operational purposes. For example, at many utility airports objects of a permanent nature are listed in the AFD if the objects lie within the boundaries of Part 77 approach surfaces; however, descriptive data about the size or location of the object relative to the runway end or centerline are not reported. Since this type of information is collected under the Airport Safety Data Program, the FAA should publish the descriptive data about significant objects as an approach or departure planning aid for pilots.

The Safety Board also noted that the lighting of obstructions is not consistently reported in the AFD and that there is no information about changes to operational procedures which may be dictated by the presence of an obstruction within the Part 77 approach surface boundaries. Since applicants for a pilot's license are not tested for knowledge of information in Part 77 or regarding information pertaining to hazards or obstructions in any other aeronautical publications, the Board believes that incorporating some explanatory material in the AFD regarding this subject would be beneficial.

#### OTHER SAFETY CONSIDERATIONS

##### Navigational Aids

Because navigation equipment plays an important part in determining an airport's operational flexibility and because the reliability of navigational aids (NAVAID's) could have safety implications, the study team surveyed airways facility staff at all the study airports to learn about problem areas. All of the airports visited had some problems with their NAVAID's. Most of the problems were associated with the age of the NAVAID equipment. This was especially true of the tube-type instrument landing systems (ILS's). The FAA has an ongoing program to replace vacuum tube-type ILS's with solid-state equipment. At the end of fiscal year 1983, approximately two-thirds of the ILS's in this country had been retrofitted, according to airways facility staff at FAA headquarters.

There were five airports that, due to their geographical location, experienced problems with their NAVAIDS. These airports were Denver Stapleton, San Diego Lindbergh, New York La Guardia, Boston Logan, and Washington National. At Denver Stapleton, a water tower along the approach to runway 26L produces reflection of



electronic signals. At San Diego Air Station, the natural air-terrain interface obstruction of the airport result in a steep approach to runway 27. New York LaGuardia, Boston Logan, and Washington National have had problems with the operation of some NAVAIDS on overwater approaches due to local or surface roughness effects, which may interfere with proper electronic signal reflection or cause the electronic beam location to shift relative to the runway as the water surface rises and falls. To correct this problem, the NAVAID must be moved to a location where signal reflection occurs on a fixed-plane surface.

Airways facility personnel at the above facilities said that many of the problems they had experienced with their NAVAIDS could be lessened or alleviated with the installation of a microwave landing system (MLS). Boston Logan, Denver Stapleton, and Washington National are slated for MLS installations within the next 2 years. The U.S. Department of Transportation (DOT) has approved the procurement of all 1,250 MLS units called for in the National Airspace System Plan. The FAA has issued a request for proposals covering the acquisition of the first 172 units over a 5-year period. The MLS uses scanning-beam techniques to provide precision guidance coverage over a much larger azimuth and elevation angle range than the present ILS, which has been in service around the world since the late 1940's. This coverage will greatly increase operational flexibility at airports by offering a wide range of final approach paths, including curved approaches good for locations such as runway 18 at Washington National. The equipment is also less sensitive to building and terrain interference and less vulnerable to environmental factors, since the MLS signal is radiated directly into space rather than reflected off a smooth ground plane as with an ILS. The National Airspace System Plan envisions all 1,250 MLS units in service at the nation's airports by the year 2,000.

The FAA has not had an active hiring program for the airways facility sector in several years. FAA headquarters management believes that the hiring and training of new personnel is unwarranted because the FAA's current Navaid Modernization Program will eliminate the need to have the present number of airways facility technical personnel. However, many airways facility personnel expressed concern over the FAA's ability to implement and complete this modernization program in a timely manner; they were especially concerned with their ability to adequately maintain the older NAVAID systems during the period of building, testing, and commissioning of the new systems. For example, Houston Hobby airway facility personnel said that a majority of their technicians would be eligible to retire within the next 5 to 8 years. Only three of their radar technicians will remain in 6 years, and it takes at least 3 years to fully train a radar technician. Boston Logan airway facility personnel said that about 46 percent of their technicians would be eligible for retirement by 1989. Boston Logan currently has no trainees, and it reported that 3 to 4 years are needed to bring a "new hire" up to "journeyman" level. Washington National airway facility personnel said that 11 out of 26 technicians would be eligible to retire within the next 5 years.

#### **Noise Abatement Procedures**

All of the 14 study airports had some form of noise control plan in effect to reduce the impact of aircraft noise on the surrounding communities. These plans ranged from simple aircraft pattern adjustments to more restrictive procedures including altitude restrictions, runway rotational programs, restrictions on type aircraft, operating curfews, and elaborate noise monitoring and enforcement programs. Although there appears to have been no accidents attributable to the operating procedures used for noise abatement, the modified approach and takeoff procedures often involve smaller safety margins than

the procedure which would have been used otherwise. For example, noise-sensitive airports favor high-altitude, low-drag, minimum-thrust approaches which provide noise relief for communities beneath approach paths. However, this type of operation detracts from stabilized approaches and can lead to high approach speeds, high rates of descent, and idle thrust levels at a high-drag configuration during landing transition. An unsuccessful transition can result in a hard landing, veer off, or overrun. Adherence to noise abatement departure profiles also require steep climbs which may detract from the flightcrew's ability to look over the glare shield for other traffic in the terminal area. Furthermore, noise abatement procedures complicate air traffic operations in the terminal area, and therefore flight operations are not conducted as efficiently as they could be. Operations at Los Angeles International, Chicago O'Hare, Boston Logan, and Kennedy International are routed over water as much as possible because of noise and traffic congestion considerations. Improved engine technology and the ingenuity and professionalism of flightcrews and air traffic control personnel have compensated to some degree for the loss in efficiency due to noise abatement concerns.

### CONCLUSIONS

1. Decreases in the rates of airport-related accidents since the inception of the Federal Aviation Administration's airport certification program in 1972 indicate a measurable improvement in airport safety.
2. The decreases in the rates of airport-related accidents probably involve several factors in addition to the airport certification program, including technological improvements in aircraft systems, upgraded navigational facilities, improved operational training, and increased awareness of the operational hazards in the terminal area.
3. The airport certification program does in fact assure that airports comply with Federal regulations and through periodic inspection provides for an evaluation of the effectiveness of airport management in conducting day-to-day operations safely.
4. The regulations in 14 CFR Part 139 and Federal Aviation Administration guidance material allow certification inspectors, who have varying experience, to make subjective evaluations of an airport's operations, which leads to the acceptance of nonstandard measures as demonstrating satisfactory compliance with the regulations.
5. Federal Aviation Administration inspection records of physical facilities and conditions at the 14 airports studied by the Safety Board generally were corroborated by the observations of the Board's study team.
6. At the study airports, the compliance measures accepted by the Federal Aviation Administration for bird hazard reduction, snow removal, and self-inspection programs differed significantly, but the measures appeared to be effective and appropriate.
7. The vagueness of certain Federal Aviation Administration compliance criteria and regional variations on the application of compliance criteria have resulted in some study airports having far better methods than others of controlling ground vehicle operation, fuel dispensing and storage, runway surface condition assessment, and public protection and animal control.

8. In general, certification inspectors tended to emphasize those areas of certification rules with which they were most familiar based on their prior professional experience or formal training.
9. Because of limited funds, most certification inspectors had limited opportunities to exchange work-related information, observe work methods of colleagues, and participate in meetings to discuss problems with airport managers.
10. The inspection workload of certification inspectors varied widely among the regional offices of the Federal Aviation Administration. Large inspection workloads in the Great Lakes and Southern regions resulted in less opportunity for inspectors in these regions to participate in information exchanges regarding airport operations.
11. Regional certification program administration lacks standardization.
12. Regionally dispersed technical expertise is not used fully in the airport certification program.
13. Most Federal Aviation Administration certification inspectors did not have experience with or knowledge of fuel storage facility operations and were unable to inspect fueling operations effectively.
14. The Federal Aviation Administration needs a standardized program to train certification inspectors to evaluate fuel dispensing procedures and storage facilities.
15. Many airports do not have staff personnel who are knowledgeable in the handling and storing of aircraft fuel.
16. Screening and training of prospective fuel-service facility employees varies substantially in thoroughness and scope among airports.
17. The Federal Aviation Administration has the legal authority to establish training and proficiency standards for refueling personnel, and many airport managers believe that the FAA should license fueling personnel.
18. The fueling vehicle condition checklists reviewed by the Safety Board study team did not provide the certification inspectors specific guidelines to be used in deciding whether to accept or reject a vehicle being inspected.
19. Construction on airports and in surrounding areas has reduced or eliminated physical separation between fuel storage facilities and developed areas.
20. Older safety and warning devices at many fuel storage facilities were not accurate or reliable.
21. Nearly all study airports voluntarily met the water and extinguishing agent guidelines of the National Fire Protection Association and the International Civil Aviation Organization, which far exceed the minimum requirements specified by the Federal Aviation Administration in 14 CFR Part 139.

22. All nine study airports which had no structural firefighting responsibilities had far more crash-fire-rescue staff per shift than permitted by 14 CFR Part 139.
23. Observations of study airports indicated that 14 CFR Part 139 minimum requirements for extinguishing agent and staffing may be unrealistically low for index C, D, and E airports.
24. Certification inspectors have not been provided minimum standard criteria by which to evaluate the adequacy of many types of crash-fire-rescue training activities conducted at airports.
25. The Federal Aviation Administration's guidelines for protective clothing for firefighting operations do not preclude the use of less effective types of clothing, and there are no criteria for judging the relative merits of the acceptable types of protective suits.
26. There is no requirement for airports to exercise emergency plans periodically.
27. Most of the proposals for changes to 14 CFR Part 139 presented at the Federal Aviation Administration's public meeting of July 14, 1983, were positive and responsive to past Safety Board recommendations.
28. The Federal Aviation Administration's proposal to reduce crash-fire-rescue requirements at index A and B airports could result in situations where large jet aircraft operations are conducted with little or no crash-fire-rescue protection at these airports.
29. There is no regulation which contains a uniform standard for the marking, lighting, and guidance signs on runways, thresholds, and taxiways of airports.
30. The rate of accidents involving encroachment of aircraft on areas adjacent to runways for the postcertification period 1973 through 1981 has decreased by more than 50 percent from the rate for the precertification period 1964 through 1972.
31. The most destructive encroachment accidents between 1964 and 1981 usually involved aircraft striking objects in areas adjoining runways.
32. At transport airports that have become physically constrained, safety areas at the ends of runways were nonexistent or marginal in comparison to design guidelines of the Federal Aviation Administration's Advisory Circular 150/5335-4, but the safety areas alongside the runways were adequate.
33. Some extended safety areas at the ends of runways on less constrained airports were smaller than recommended in design guidelines of the Federal Aviation Administration's Advisory Circular 150/5335-4, but longer runways at these airports gave more overrun protection. The safety areas alongside the runways were adequate.
34. The extension of safety area dimensions at the ends of runways at smaller airports surrounded by commercial development would not be economically feasible in most cases.

35. The soft-ground aircraft arresting concept may be an economical means of safely improving stopping capability in dimensionally limited safety areas on runways bounded by water.
36. Most of the structures located within the runway safety areas are mounted on frangible supports. Some structures which must remain in safety areas to serve an operational function are not frangible, and as yet experts have not been able to design submerged supporting structures which satisfy low impact resistance criteria and still withstand forces caused by immersion in water.
37. There is no Federal regulation restricting the construction of off-airport structures that obstruct the nation's navigable airspace. The Federal Aviation Administration has been successful in limiting the number of obstructions by negotiation.
38. Past Safety Recommendations made by the Safety Board based on several accident investigations indicate that obstacles which pose potential hazards to aircraft operations probably are more prevalent at noncertificated utility airports than at transport airports, and that they are less precisely described in aeronautical publications.
39. Measures to protect the airspace around the nation's airports for aircraft operations recommended by the President's Airport Commission in 1952 have not been implemented.
40. Many navigational aid problems at the study airports were related to difficulty in maintaining aging vacuum tube-type instrument landing systems or difficulty in maintaining acceptable system tolerances due to reflective problems caused by man-made and topographical features.
41. During transition to new low-maintenance navigational systems, the operability of the remaining existing systems could be affected by projected reductions in airways facilities technical maintenance staff.
42. Although the nation's noise abatement policy may be a reasonable approach to the problem of aircraft noise, the establishment of noise abatement procedures can adversely affect the efficiency of aircraft operations and could create safety hazards.

#### RECOMMENDATIONS

As a result of this safety study, the National Transportation Safety Board recommends that the Federal Aviation Administration:

Amend 14 CFR 139.65, "Public Protection," to require safeguards against unauthorized entry of persons and inadvertent entry of large animals onto any airport operations area. (Class II, Priority Action) (A-84-21)

Revise FAA Order 5280.5, "Public Protection," to establish criteria for acceptable types of fencing and support structure and a policy for gate security for the air operations area at certificated airports. (Class II, Priority Action) (A-84-22)

Revise FAA Order 5280.5, "Ground Vehicles," to include specific criteria for determining the adequacy of ground vehicle control, such as the number of ground vehicle accidents each year, disciplinary actions taken in accident cases, the number of repeat offenders, and an annual accident rate. (Class II, Priority Action) (A-84-23)

Establish an airport directorate within the FAA, similar to aircraft certification directorates, having technical resources and authority to provide leadership for the airport certification program and consistent application of 14 CFR Part 139. (Class III, Longer-Term Action) (A-84-24)

Certify fueling personnel at certificated airports. (Class III, Longer-Term Action) (A-84-25)

Establish designated fueler certification examiners to ensure a uniform standard for fueling training, knowledge, and competence at certificated airports. (Class III, Longer-Term Action) (A-84-26)

As an interim measure until a program for certifying fueling personnel can be established, revise the compliance criteria applicable to certificated airports in FAA Order 5280.5, "Handling and Storage of Hazardous Material," to contain specific standards for initial and recurrent training of fueling personnel, which address methods of assuring fuel quality, fire prevention, vehicle inspection and operation, proper fueling techniques, and knowledge of airport operating rules. (Class II, Priority Action) (A-84-27)

Revise the compliance criteria in FAA Order 5280.5, "Handling and Storage of Hazardous Material," to incorporate detailed procedures for fuel storage area inspections and specific facility acceptability criteria. (Class II, Priority Action) (A-84-28)

Require certificated airports to include fuel storage and dispensing facilities in the selfinspection program prescribed in 14 CFR 139.57 and 139.91 and specify the items, including tank overfill warning devices, which must be checked and approved by airport inspection staff. (Class II, Priority Action) (A-84-29)

Adopt design and construction standards for fuel storage area site selection and safety devices at airport fuel storage facilities to be applied uniformly to new airports receiving Federal funds or to currently certificated airports when storage facilities are relocated. (Class III, Longer-Term Action) (A-84-30)

Revise 14 CFR 139.49(b) crash-fire-rescue index requirements for water and extinguishing agents to include the recommendations for extinguishing agents specified by the International Civil Aviation Organization or as published in FAA Advisory Circular 150/5210-6B. (Class II, Priority Action) (A-84-31)

Revise 14 CFR 139.49(h) to require a minimum of two firefighters per vehicle and to specifically define minimum standards for training of crash-fire-rescue personnel. (Class II, Priority Action) (A-84-32)



Revise FAA Order 5280.1, "Fire Fighting and Rescue," to prescribe equipment equal to or better than the proximity suit with lining that is recommended in paragraph 154d, as acceptable for aircraft firefighting and to contain standards by which the adequacy of this protective clothing can be determined, for the most extreme exposure conditions which can be safely encountered. (Class II, Priority Action) (A-84-33)

Amend 14 CFR 139.55 to require a full-scale demonstration of certificated airport emergency plans and procedures at least once every 2 years, and to require an annual validation of notification arrangements and coordination agreements with participating parties. (Class II, Priority Action) (A-84-34)

Incorporate in any 14 CFR Part 139 rulemaking proposal calling for a reduction in crash-fire-rescue capability at index A and B airports a list of affected airports, a list of types and schedules of air carrier aircraft serving these airports, and a description of the effect of such a reduction on the firefighting posture of the airports. (Class II, Priority Action) (A-84-35)

Initiate research and development activities to establish the feasibility of submerged low-impact resistance support structures for airport facilities, and promulgate a design standard, if such structures are found to be practical. (Class II, Priority Action) (A-84-36)

Initiate research and development activities to establish the feasibility of soft-ground aircraft arresting systems and promulgate a design standard, if the systems are found to be practical. (Class III, Longer-Term Action) (A-84-37)

Where elimination of obstructions that have a significant adverse effect on aircraft operation at public-use airports is not feasible, publish detailed data on the location of the obstructions and corresponding operational procedures or flight restrictions in the Airport/Facility Directory. (Class II, Priority Action) (A-84-38)

Seek statutory authority to prescribe civil penalties for sponsors of proposed construction who fail to comply with the notification requirements of Subpart B of 14 CFR Part 77. (Class II, Priority Action) (A-84-39)

Incorporate into pilot training programs and appropriate aeronautical publications sufficient information on the Airport Safety Data Program to familiarize airmen with the criteria in 14 CFR Part 77 used to determine whether an object is an obstruction to air navigation that might adversely affect aircraft operations. (Class III, Longer-Term Action) (A-84-40)

Provide continuing maintenance services for existing navigational facilities during the period of transition to the new generation of equipment. (Class II, Priority Action) (A-84-41)

## BY THE NATIONAL TRANSPORTATION SAFETY BOARD

/s/ JIM BURNETT  
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Vice Chairman

/s/ G. H. PATRICK BURSLEY  
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/s/ DONALD D. ENGEN  
Member

/s/ VERNON L. GROSE  
Member

April 11, 1984

Mr. BURNETT. Thank you.

Mr. GORE. Thank you very much for being here, and we are sorry to delay you for your appointment over on the other side.

Now, let me call our next witness, Capt. Henry Duffy, president of the Airline Pilots Association here in Washington.

Captain Duffy, it is always a pleasure to have you appear here. Without objection, we will include the full text of your prepared statement in the record at this point. If you care to summarize any portion of your statement, feel free to do so. We are delighted to welcome you here. Please proceed with your statement.

[The prepared statement of Capt. Henry Duffy follows:]

STATEMENT OF  
CAPTAIN HENRY A. DUFFY, PRESIDENT  
AIR LINE PILOTS ASSOCIATION  
BEFORE THE  
SUBCOMMITTEE ON TRANSPORTATION, AVIATION AND MATERIALS  
COMMITTEE ON SCIENCE AND TECHNOLOGY  
U. S. HOUSE OF REPRESENTATIVES  
MARCH 21, 1984

WASHINGTON NATIONAL AIRPORT  
RUNWAY 18 APPROACH PROCEDURES

Good afternoon Mr. Chairman and members of the Subcommittee. I am Henry Duffy, President of the Air Line Pilots Association. Accompanying me today is John O'Brien, Director for our Engineering and Air Safety Department. We are testifying today on behalf of 34,000 professional air carrier pilots who fly for 45 airlines. We commend the Subcommittee for its ongoing concern about the safety of our nation's airports, and we appreciate the opportunity to present our views concerning the safety of operations at National Airport.

The discussion of airport safety, including ways to improve present operational safety margins is of vital concern to the members of this Association. Historically, aeronautical research and development efforts have been confined both by government and industry to the development of two of the three prime elements of our air transportation system, i.e., the aircraft, and the air traffic control system. The third element, the airport, which is both the starting and ending point of the air transportation system, has been

merely reactive, adjusted and readjusted to accommodate improvements and changes in other elements of the total system.

Over the past several years, the prominent safety problem at airports served by air carriers has been the operation of aircraft in bad weather. In response to that problem several actions have been taken. Ground Proximity Warning Systems were required on all air carrier aircraft. Pilot training programs were modified so that crews would be better prepared to respond to the demands of low visibility operations. Visual approach aids on airports have been improved, and more airport precision approach aids have been installed. A Minimum Safe Altitude Warning (MSAW) alert feature has been installed on ATC radar systems at many airports. All of these actions or reactions have led to a reduction in the number of approach and landing accidents over the past few years, but there are occasions when the airplane/airport interface is adversely affected by bad weather, sometimes with tragic results.

Today we are reacting to an airport safety problem concerning use of the Runway 18 approach procedures at National Airport. This problem has intensified recently through a combination of three factors. First, the construction of tall buildings in close proximity to the aircraft approach paths into National Airport; second, the impact of adverse weather conditions on aircraft attempting to navigate these complex approach procedures into National Airport; and third, altitude information for aircraft utilizing these approaches into National Airport now available from the MSAW system.

On many occasions in the past ALPA has testified before this Committee and other Congressional Committees about safety deficiencies which existed at National Airport. High on our list of concerns was the problem of operating

safely while using Runway 18 approach procedures during adverse weather conditions. Until recently our primary problem with the Runway 18 approach procedures resulted from the fact that normal straight-in ILS or other approaches cannot be implemented because of the restricted areas and obstructions which are located just north of the airport. This situation mandates that the FAA must install offset approaches into Runway 18. These approaches require that the pilot must maneuver his or her aircraft at a low altitude by means of visual reference in order to get lined up for a safe landing on Runway 18. Our concerns were intensified when construction of tall buildings near the runway approach paths to Runway 18 commenced. To the best of our knowledge none of these buildings penetrated the obstruction clearance planes for the Runway 18 approach procedures so we were unable to object to these construction projects on that basis. We did, however, make known our concerns over the impact these buildings might have on a pilot's ability to maneuver properly his or her aircraft during the visual segment of these complex approach procedures under marginal weather conditions. We made these concerns known to the FAA and the NTSB in correspondence, to Congress, through many appearances before several Congressional committees, and to the public through the news media. Finally, the magnitude of the problem has been confirmed by personal observation by occupants of the USA Today building and through analysis of MSAW data. This is not just an isolated problem which occurs once or twice a year. This is a problem which exists every time we are forced to use Runway 18 procedures in adverse weather conditions.

As you know, the FAA has announced plans to improve the Runway 18 approach procedures into National Airport. We fully support this FAA initiative. As we understand it, the FAA plans to accomplish the following at Washington National Airport by the summer of 1984:

1. Retain the existing LDA Runway 18 (with GS) approach procedure as published and install a new solid state localizer antenna to replace the existing tube type.
2. Publish a new procedure, LDA/DME Runway 18 (with GS) predicated on a new solid state localizer antenna sited next to the LDA Runway 18 antenna. The new procedure will overlay the existing VOR DME Runway 18 approach procedure which will have a common final approach course ( $146^{\circ}$  true/ $153^{\circ}$  magnetic) and a common missed approach point (DH 720, 2.2 DME).
3. The existing glide path antenna will be replaced with a solid state antenna and will serve both of the LDA approach procedures.
4. One DME antenna will serve all of the three approaches (VOR/DME, LDA, and LDA/DME) and will be collocated between the two LDA antennae and in front of the VOR.

In our opinion the most significant improvements to these procedures are the recent addition of a Visual Descent Point (VDP) concept to the VOR/DME procedure and the planned improvements in precision vertical guidance for the pilot through the installation of a new glide slope for the LDA approach. Both of these actions will improve the pilot's ability to maintain adequate vertical clearance over the USA Today building.



We will inform ALPA members through our safety structure about these improvements and remind them of the added responsibilities placed on the pilot through implementation of this VDP concept. Our safety representatives will continue to work with FAA in an attempt to further improve the utilization of the Runway 18 approach procedures.

When completed, these improvements will go a long way toward eliminating many of the safety hazards which are presently part of the Runway 18 procedures. And, we have reason to believe that FAA and DOT will continue to work toward other or additional improvements for these approaches.

**STATEMENT OF CAPT. HENRY A. DUFFY, PRESIDENT, AIRLINE PILOTS ASSOCIATION, ACCOMPANIED BY JOHN O'BRIEN, DIRECTOR, ENGINEERING AND AIR SAFETY DEPARTMENT**

Captain DUFFY. Thank you, Mr. Gore.

With me today is Mr. John O'Brien, who is director of our engineering and air safety department.

We are happy to present our views concerning the safety of operations at National Airport.

The discussion of airport safety, including ways to improve present operational safety margins, is of vital concern to the members of ALPA. Historically, aeronautical research and development efforts have been confined both by Government and industry to the development of two of the three prime elements to our air transportation system: The aircraft and the air traffic control system.

The third element, the airport—which is both the starting and ending point of the air transportation system—has been merely reactive, adjusted and readjusted to accommodate improvements and changes in other elements of the total system.

Over the past several years, the prominent safety problem at airports served by air carriers has been the operation of aircraft in bad weather. In response to that problem, several actions have been taken. Ground proximity warning systems were required on all air carrier aircraft. Pilot training programs were modified so that crews would be better prepared to respond to the demands of low visibility operations. Visual approach aids on airports have been improved, and more airport precision approach aids have been installed. A minimum safe altitude warning alert feature [MSAW] has been installed on ATC radar systems at many airports.

All of these actions or reactions have led to a reduction in the number of approach and landing accidents over the past few years. But there are occasions when the airplane/airport interface is adversely affected by bad weather, sometimes with tragic results.

Today, we are reacting to an airport safety problem concerning the use of runway 18 approach procedures at National Airport.

This problem has intensified recently through a combination of three factors.

First, the construction of tall buildings in close proximity to the aircraft approach path at National Airport.

Second, the impact of adverse weather conditions on aircraft attempting to navigate these complex approach procedures into National Airport.

Third, altitude information for aircraft utilizing these approaches into National Airport now available from the MSAW system.

On many occasions in the past, ALPA has testified before this committee and other congressional committees about safety deficiencies which existed at National Airport. High on our list of concerns was the problem of operating safely while using runway 18 procedures during adverse weather conditions.

Until recently, our primary problem with the runway 18 approach procedures resulted from the fact that normal straight-in ILS or other approaches cannot be implemented because of the restricted areas and obstructions which are located just north of the airport.

This situation mandates that the FAA must install offset approaches into runway 18. These approaches require that the pilot must maneuver his aircraft at a low altitude by means of visual reference in order to get lined up for a safe landing at 18.

Our concerns were intensified when construction of tall buildings near the runway approach path to runway 18 commenced. To the best of our knowledge, none of these buildings penetrated the obstruction clearance planes for the runway 18 approach procedures. So, we were unable to object to these construction projects on that basis. We did, however, make known our concerns over the impact of these buildings, that these buildings might have, on a pilot's ability to maneuver properly his aircraft during the visual segment of these complex approach procedures under marginal weather conditions. We made these concerns known to the FAA and the NTSB in correspondence; to the Congress through many appearances before several congressional committees; and to the public through the news media.

Finally, the magnitude of the problem has been confirmed by personal observation of the occupants of the USA Today building and through analysis of Minimum Safe Altitude Warning system data. This is not just an isolated problem which occurs once or twice a year. This is a problem which exists every time we are forced to use runway 18 procedures in adverse weather conditions.

As you know, the FAA has announced plans to improve the runway 18 procedures into National Airport. We fully support that initiative. As we understand it, the FAA plans to accomplish the following at Washington National Airport by the summer of 1984:

One. To retain the existing LDA runway 18, with the glide slope, approach procedure as published and install a new solid state localizer antenna to replace the existing tube type.

Two. To publish a new procedure, an LDA and DME runway 18, with glide slope, predicated on a new solid state localizer antenna sited next to the LDA runway 18 antenna. The new procedure will overlay the existing VOR DME runway 18 procedure, approach

procedure, and will have a common final approach course and a common missed approach point.

Three. The existing glide path antenna will be replaced with a solid state antenna and will serve both of the LDA approach procedures.

Four. One DME antenna will serve all of the three approaches, VOR/DME, LDA, and LDA/DME, and will be colocated between the two LDA antennae and in front of the VOR.

In our opinion, the most significant improvement to these procedures are the recent addition of the visual descent point [VDP] concept to the VOR/DME procedure and the planned improvements in precision vertical guidance for the pilot through the installation of a new glide slope for the LDA approach. Both of these actions will improve the pilot's ability to maintain adequate vertical clearance over the USA Today Building.

We will inform ALPA members throughout safety structure about these improvements and remind them of the added responsibilities placed on the pilot through the implementation of the VDP concept. Our safety representatives will continue to work with FAA in an attempt to further improve the utilization of runway 18 approach procedures.

When completed, these improvements will go a long way toward eliminating many of the safety hazards which are presently part of the runway 18 procedures. And, we have reason to believe that FAA and DOT will continue to work toward other and additional improvements for these approaches.

With that, we will be happy to answer any questions, Mr. Gore. Mr. GORE. Thank you very much.

Last July, ALPA testified as to some specific recommendations on runway 18 approach procedures that came out of the 1978 FAA staff study.

Have those recommendations been followed to any degree and what has been the difficulty with it?

Captain DUFFY. No; they have not. Let me just put this in a broad perspective.

Our problem as pilots mainly is, we have to follow the river down and then we have to make this 30° turn in order to get lined up for runway 18. There is no way, we are convinced, that we are going to get a straight-in approach to 18, which would be the solution to all of our problems.

We have wanted from the very beginning horizontal and vertical guidance to take us to a point where we can line up for runway 18. Now, all the procedures that we are talking about now are going to keep us away from the buildings and all of that is fine, but at some point the pilot has got to make an offset and slide off to the left in order to get enough room to line up for 18.

All of the present procedures point us at the corner of that runway, and then we have to make a 30° turn. That is a major flaw. That has got to be corrected eventually.

Mr. GORE. I see. But those recommendations still have not been followed at all.

Captain DUFFY. Correct. Well, let me say the VDP concept is, we think, a major interim improvement.

Mr. GORE. Now, you testified last summer that the approach to National was the most difficult to all the routinely flown approaches. Will the new procedures change your opinion on the difficulty of that approach, will it make it less difficult or more difficult, or what?

Captain DUFFY. No; it is still going to be difficult. The problem now is, the VDP is going to hold us up at this 720-foot altitude to a point 2.2 miles from the edge of the runway.

Mr. GORE. Yes.

Captain DUFFY. But at that point, if we followed the procedure, we would be 2.2 miles from the runway, pointed at the edge of the runway, and the runway is going off this way.

Mr. GORE. Yes; and you still have to lose altitude, cut to the left, and then make a 30° turnback to the right.

Captain DUFFY. Right. Simply losing the altitude would not be a problem, but at the same time you are kicking off to the left and making a 30° turnback to the right, that complicates the procedure.

Mr. GORE. Yes.

Let me forgo my other questions in the interest of time and recognize Congressman Boehlert.

Mr. BOEHLERT. Captain Duffy, are pilots being immediately advised by the National air traffic control tower when the MSAW equipment indicates that they are below or at the level, below the safe altitude level?

Captain DUFFY. From the testimony, obviously not, Mr. Boehlert. But let me say, there is a basic misunderstanding in what I have heard so far.

That is, when the pilots go visual, when the pilots visually see the end of the runway, they are allowed to go below minimum altitudes and therefore the MSAW going off is not an absolute indication that there is a problem out there.

Mr. BOEHLERT. Would that not be an incentive for them to go below minimum altitudes in a hurry so that they can say they visually see the end of the runway, and then they are right, they are authorized to be below the minimum?

Captain DUFFY. No. I am talking about when they descend down to the minimum descent altitude. Let us say they have arrived at the minimum descent altitude and now they see the end of the runway.

Mr. BOEHLERT. Right.

Captain DUFFY. They can duck under at that point because they now have legal way to do that. They have the runway environment in sight and now they can continue a visual approach which they must eventually do. That is one of the built-in features of this runway 18 approach.

All of them end with the kickout to the left and the turnback to the right, and the descent down to the runway. So, when the pilot sees the runway, no matter what point he is in his approach toward the runway, he can start to duck under legally. The MSAW might go off and everything would be fine.

So, the number of MSAW alerts, I would suggest to you, is not necessarily an indication of real problems out there because the pilot may in fact be visual.

Mr. BOEHLERT. It is my understanding that you have talked about FAA negotiating with DOD and the Park Service for land to put the localizer on it. Do you know the status of that? Maybe I am asking the wrong witness.

Captain DUFFY. I think FAA needs to cover that. But let me say, that is what we see as the solution, the best solution, short of maybe the microwave landing system coming in that could actually give you a curved approach into the runway, where you would have electronic guidance all the way down and it would actually guide you in.

Short of that, we want vertical and horizontal guidance to the point where we can make the straight-in approach. That does not exist today.

Mr. BOEHLERT. Do you feel comfortable that we are now on the right course with corrective action?

Captain DUFFY. Yes, sir. It is too bad that we had to have the number of incidents that have taken place. But I think everyone now is on the right track.

We need to keep pushing. This needs to be an expeditious move.

Mr. BOEHLERT. Thank you, Captain.

Mr. GLICKMAN [presiding]. Mr. Wolf?

Mr. WOLF. On your last page, you say, "an attempt to further improve the utilization of Runway 18 approach procedures. When completed, these improvements will go a long way toward eliminating . . . DOT will continue to work toward additional improvements."

So, there really are some other things that can be done. When I came in, I caught the end of that, the microwave. Have you asked the FAA to do these other things?

Captain DUFFY. In our discussions with FAA, and I think you need to have this discussion with them, they are looking at procedures that would lead us to this point off the end of the runway where we could then be in a position to make the straight-in.

Mr. WOLF. Why not do that?

Captain DUFFY. I think that is going to take some negotiation with some other agencies.

Mr. WOLF. Well, this airport is owned and operated—sometimes unfortunately—by the Federal Government. I mean, they ought to be able to negotiate with other agencies, DOT, or Park Service, or Interior. That should not take any time at all.

You mean that is the only thing holding up this microwave?

Captain DUFFY. The microwave is in the process of being developed technologically, that is not quite ready.

What I am talking about would be horizontal guidance to a point off the direct end of the runway where we could make a straight-in approach to 18.

All of these procedures right now point you toward the edge of the runway and then you have to make a 30-degree turn. We want to be aligned with the point off the end of the runway where we can make a straight-in.

Mr. WOLF. And that technology is available today.

Captain DUFFY. Yes.

Mr. WOLF. Then I think we should ask about that.



Let me ask you one other question. Will this new procedure slow down the approach in the use of National Airport? Meaning, can you take fewer flights an hour than you currently have? It will not slow down or will it slow down?

Captain DUFFY. I do not think so, Mr. Wolf. I know you would like that to be the outcome. No, what it is going to do for us is, it is going to give us positive vertical guidance down to that point, and it is also going to provide us with horizontal guidance.

Mr. GLICKMAN. Hank, I am sorry I couldn't be here. We have the bankruptcy bill on the House floor——

Captain DUFFY. I want to get over there.

Mr. GLICKMAN [continuing]. Which I know is near and dear to your heart. So I am sure the other members have asked thoughtful questions of you. We appreciate your being here today very much.

Captain DUFFY. Thank you, Mr. Chairman.

Mr. GLICKMAN. Our next witness is Mr. J. Roger Fleming, vice president of operations, of the Air Transport Association of America. And our last witness will be Mr. Joseph Del Balzo with the FAA. And we hope to be able to be out of here in 45 minutes or so after those witnesses.

Mr. Fleming, we are appreciative that you came here today. And you may proceed in any way you deem appropriate. Your entire statement will be included in the record.

#### STATEMENT OF J. ROGER FLEMING, VICE PRESIDENT, OPERATIONS, AIR TRANSPORT ASSOCIATION OF AMERICA

Mr. FLEMING. Thank you, Mr. Chairman. In the interest of saving your time, I will paraphrase the statement, since Chairman Burnett has already made many of the facts available to the committee.

The airlines appreciate the opportunity to appear before you today to offer our views on the southbound approaches to Washington National Airport and to express our support for a number of improvements that will enhance safety.

Mr. Burnett has told you about the genesis of the NTSB safety recommendations and the negotiations that went on between NTSB and FAA, so I will not cover that territory again.

In our view, the existing instrument approaches to runway 18 at Washington National Airport are adequate to support safe operations if the procedures are flown properly and the appropriate regulations in FAR parts 91 and 121 are strictly adhered to.

The reports of flights in proximity to the office building in Rosslyn understandably raise questions regarding these approaches, and a thorough investigation is obviously required to understand the underlying reasons and to determine the need for introduction of improvements to the instrument approaches to avoid any recurrence.

And in that respect, we support the efforts of NTSB, FAA, and this committee to improve the southbound approaches to Washington National.

We understand that the reports about low flight in the vicinity of Rosslyn have all been recorded when an instrument approach



identified as VOR DME runway 18 was in use, and that is the procedure that Chairman Burnett and Captain Duffy both addressed.

We also understand that the VOR DME runway 18 approach is infrequently utilized, generally when weather conditions preclude use of some other approach. As you have heard, the VOR DME approach does not have an electronic glide path as does the LVA runway approach. But the glide path for LDA runway 18 is unusable below 1,100 feet, thus reducing its utility.

Airlines prefer that electronic glide paths usable at low altitudes be available to aid pilots of turbojet aircraft to conduct stabilized approaches to landing. Thus, improved glide path guidance is a highly desirable improvement.

We have been informed that FAA is planning the following improvements for the southbound approaches, and we support these actions.

The visual descent point, which has already been added to the VOR DME runway 18 approach effective March 15, is on all the instrument approach charts that are being used by pilots today.

The new localizer will be installed to provide a higher quality signal for the 153-degree final approach course, and DME frequency paired with the localizer will be added, as has been described. A solid state localizer transmitter will also be installed for the 147-degree final approach course.

The existing glide path installation serving the LDA approach will be upgraded in quality by replacing existing equipment with solid state equipment. The new glide path installation should provide a high-quality electronic glide path usable to low altitudes for both the 147 and the 153-degree final approach courses. Thus, two LDA approaches with glide path and DME will be available, although only one will be in use at any given time.

We understand also that a test program will be undertaken involving the installation of new lead-in lights on four bridges over the Potomac, rather than just the Memorial Bridge, will be undertaken.

The lead-in lights should help the pilots ability to more clearly visualize the most advantageous path to follow to make the final alinement maneuver that Captain Duffy described.

We understand that the system improvements noted above, with the exception of the VDP, the visual descent point which has already been implemented, are to be commissioned late this summer.

The 18-member airlines serving Washington National endorse all the improvements. We believe these are constructive steps that will contribute to an improved operating environment for the southbound approaches to the airport.

That concludes my statement, Mr. Chairman. And I am now prepared to respond to your questions.

[The prepared statement of Mr. Fleming follows:]

Statement of J. Roger Fleming  
Vice President, Operations  
Air Transport Association of America, before the  
House Science and Technology/Transportation, Aviation  
and Materials Subcommittee, March 21, 1984

MR. CHAIRMAN AND MEMBERS OF THE COMMITTEE

My name is J. Roger Fleming. I am Vice President, Operations of the Air Transport Association of America, which represents scheduled air carriers. I am pleased to appear before you today to offer our views on the southbound approaches to Washington National Airport, and to express our support for a number of improvements that will enhance safety.

On March 24, 1983, the National Transportation Safety Board (NTSB) issued four safety recommendations to the Federal Aviation Administration (FAA) concerning the instrument approaches to runway 18 at Washington National Airport and the location of the radar antenna for the ASR-7 airport surveillance radar that serves the airport. These safety recommendations resulted from the Board's investigation of a flight that was reported by ground witnesses to have flown close to an office building in Rosslyn, Virginia. This building reaches an elevation of 390 feet above mean sea level.

An exchange of correspondence between FAA and NTSB followed publication of the March 1983 NTSB Safety Recommendations, culminating in a December 31, 1983 letter from the FAA Administrator to the NTSB Chairman advising of actions that will be taken by FAA to improve the approaches to Runway 18 at Washington National Airport.

We are informed that on Thursday afternoon, March 8, 1984, one or more airline flights were reported by ground observers to have passed in proximity to the same Rosslyn office building. The FAA and NTSB are investigating the flight paths and altitudes flown by airplanes arriving at Washington National Airport that afternoon. These investigations are still underway, but some information may be made available to the Committee today by the two agencies. Because the NTSB and FAA investigations are ongoing, it would be premature for me to speculate about the reported incidents.

Existing instrument approaches to Runway 18 at Washington National Airport are adequate to support safe operations, if the procedures are flown properly and the appropriate regulations in FAR Parts 91 and 121 are strictly adhered to. But the reports of flights in proximity to a large office building in Rosslyn understandably raise questions regarding these approaches. To resolve these questions a thorough investigation of the incidents is required to understand the underlying reasons and to determine the need for introduction of improvements to the instrument approaches to avoid recurrence. We support the efforts of NTSB, FAA and this Committee to improve the south-bound approaches to Washington National.

We understand that the reports about low flight in the vicinity of Rosslyn have all been recorded when an instrument approach identified as "VOR DME Runway 18" was in use. The VOR DME Runway 18 approach is infrequently utilized -- generally when weather conditions preclude use of some other approach.

The VOR DME approach does not have an electronic glide path, as does the companion approach to Runway 18, "LDA Runway 18". But the glide path for LDA Runway 18 is unusable below 1100 feet mean sea level, thus reducing its utility. Airlines prefer that electronic glide paths, usable at low altitudes, be available to aid pilots of turbojet aircraft conduct stabilized approaches to landing. Thus, improved glide path guidance is a highly desirable improvement.

We have been informed that FAA is planning the following improvements to the southbound approaches and we support these actions:

- A Visual Descent Point (VDP) has been added to the VOR DME Runway 18 approach, effective March 15, 1984. A VDP, according to the Airman's Information Manual, is "A defined point on the final approach course of a non-precision straight-in approach procedure from which normal descent from the MDA (minimum descent altitude) to the runway touchdown point may be commenced, provided the approach threshold of that runway, or approach lights, or other markings identifiable with the approach end of that runway are clearly visible to the pilot". The VDP should assist pilots by more clearly marking the point in space at which a normal final descent from the MDA to the point of intended landing should be commenced. Conversely, premature descent prior to reaching the VDP should not be commenced, absent some compelling reason.

- A new localizer will be installed to provide a higher quality signal for the 153° final approach course, and DME frequency paired with the localizer will be added. A solid state localizer transmitter will also be installed for the 147° final approach course (LDA Runway 18).
- The existing glide path installation serving the LDA Runway 18 approach will be upgraded in quality by replacing existing tube-type equipment with solid state equipment. The new glide path installation should provide a high quality electronic glide path, usable to low altitudes, for both the 147° (existing LDA Runway 18) and 153° (existing VOR DME Runway 18) final approach courses. Thus, two LDA approaches with glide path and DME will be available, although only one will be in use at a given time.
- New lead in lights, similar to the one already installed on the Memorial Bridge, will be added to three nearby bridges to more clearly mark the most advantageous path to follow visually in order to align the aircraft with the extended center line of the runway.

We understand that the system improvements noted above, with the exception of the VDP which is already implemented, are to be commissioned late this summer. The ATA member airlines serving Washington National endorse all the improvements. These are constructive steps that will contribute to an improved operating environment for the southbound approaches to the airport.

This completes my testimony. I am prepared now to respond to your questions.

Mr. GLICKMAN. Mr. Fleming, I have gotten the feeling, and I think my staff has indicated to me, that the ATA has had a certain coolness to the microwave landing system. Is that—am I stating that accurately?

Mr. FLEMING. Mr. Chairman, if you would characterize our reactions as "coolness," I would say that would be the case only with respect to FAA's implementation plan for MLS, not MLS per se. We have long advocated MLS as a necessary step in the eventual replacement of ILS.

Mr. GLICKMAN. Well, I want to know whether the FAA's actions at this airport and their requirements that they have taken in any way soften your coolness toward the MLS particularly at National Airport.

Mr. FLEMING. First, let me state, Mr. Chairman, that I don't honestly see a direct connection between the two. Captain Duffy spoke about the difficulty of making the final alinement maneuver, and there were several questions about the possibility of microwave landing system as an aid to the pilot in providing guidance for that kind of a maneuver.

But at the present time, the MLS is not a mature system in the sense that it is at a point in its development where it would permit implementation of a curved approach path, which would obviously be required for runway 18 at Washington National Airport.

At the present time, FAA is talking about basically straight-in approaches. Again, the improvements FAA has—has planned for this airport are based on ILS technology; in this case an ILS that's not alined with the runway, so it's called an LDA, or a localizer directional aid.

Again, I see no direct connection, Mr. Chairman.

Mr. GLICKMAN. Has ATA gotten involved at all with the—in connection with the construction of buildings in the Rosslyn area and/or cranes or other tall devices, or do you just leave that to the FAA to worry about?

Mr. FLEMING. Mr. Chairman, when the FAA receives notice of intended construction in accordance with the requirements of FAR part 77, they normally circulate documents to members of the in-



terested aviation public that advise of the planned construction and their evaluation.

My understanding is that all those buildings in Rosslyn represent no violation of any of the provisions of FAR 77. And as you know, FAR 77 does not preclude construction.

Mr. GLICKMAN. I know. It probably should.

Well, I—or if we could do that.

I thank you for your testimony. I thank the ATA for their remarks. You know, this remains a problem airport, and, you know, no matter what you call a problem airport, even if you dress it up, it still in my judgment remains a problem airport. And what the FAA has done, based upon a lot of pressure from a lot of folks, including yourself, is to enhance the margin of safety a bit. But I just—I have felt this way for the last several years, and I will remain feeling this way, that unless we change the type of airplanes that fly into that airport, that we—we are going to continue to have these kinds of problems. The airport was not built for the latter part of the 20th century, no matter how we try to renovate it or adapt it.

Mr. Boehlert.

Mr. BOEHLERT. No questions, Mr. Chairman.

Mr. GLICKMAN. Mr. Wolf.

Mr. WOLF. No questions, Mr. Chairman.

Mr. GLICKMAN. Thank you very much.

Mr. FLEMING. Thank you, Mr. Chairman.

Mr. GLICKMAN. Our last witness is Mr. Joseph Del Balzo, director, eastern region of the FAA.

We thank you for coming, and you may proceed, Mr. Del Balzo, as you deem it appropriate. Your entire statement will be included in the record.

**STATEMENT OF JOSEPH M. DEL BALZO, DIRECTOR, EASTERN REGION, FEDERAL AVIATION ADMINISTRATION, ACCOMPANIED BY NORBERT OWENS, MANAGER, EASTERN REGION AIR TRAFFIC DIVISION; AND JOHN KERN, AVIATION SAFETY OFFICE**

Mr. DEL BALZO. Mr. Chairman, thank you very much. And I certainly appreciate the opportunity to appear before you today to discuss the reviews that FAA has made of the southbound approach to runway 18 of National Airport.

And I had originally intended in my prepared statement to talk about the steps that we have taken in order to add safety to that approach. I don't think that I can add very much to anything that has been said by the previous witnesses. I would prefer instead to summarize my originally prepared statement and summarize also an unprepared statement which I believe is required to set correct some of the facts that I heard today and some of the implications that I heard today that I think need to be corrected for the record.

Let me start with what I believe to be incorrect statements and implications. What I heard today was a statement that said if FAA followed NTSB recommendations last March, the problems this March would not have occurred.

I disagree. The fact is, if procedures are followed, the problem would not have occurred this March.

I heard a statement that said if the visual descent point had been adopted last March, the incidents this March would not have occurred.

Again, I say that if procedures that were in place last March were followed, the incident this March would not have occurred.

There was a statement made that eyewitnesses on the ground claimed that an aircraft went below the height of a building and had to climb back up to above that building to miss it head on.

I submit that the fact is that there were additional eyewitnesses in a control tower that very same day, with years of professional experience, who judged that an unsafe condition did not exist.

There was a statement made that 9 of 46 flights on a given day resulted in MSAW alerts. A statement was made that two of nine resulted in advisories, and a question was attempted to be answered as to why the additional seven advisories were not given.

And that question led to what I believe is a false conclusion, that either an alarm in the tower was turned down or tuned out or an alarm did not go off. The fact is I don't believe that we here fully understand the function of what we call MSAW and the role of controller.

MSAW is intended to alert a controller about a potential unsafe condition, and a controller then uses his judgment to decide what that appropriate action is to be. And in this case, a professional controller decided that in only two out of nine situations should an advisory be given.

Statements continually were made during the day that this MSAW function is not operating properly. To the best of our knowledge and the testing that we have done, MSAW appears to operate properly. And I believe that confusion still exists, again over the function of MSAW and the role of the controllers.

There was a statement made regarding the unsafe conditions that exist on the approach to runway 18. And again I believe the fact is that the runway 18 approaches, all three of them, meet all safety criteria.

There was a statement which I believe was a fuzzy reply that was given to a question, "Would you agree that the FAA solution is superior to NTSB recommendation?" I don't think the answer to that question needs to be fuzzy at all. I think the answer is, "Yes," and we are prepared to defend that.

There was a statement made that a terrible disaster was averted by luck. And I think the fact is that's nonsense. It was averted by professional pilots, professional controllers, and safe procedures.

There was a statement made that FAA drags its feet in responding to NTSB's safety recommendations. And I think the facts will show that FAA responds when warranted after careful consideration, as we have in this case.

What is the result? The result is a safer, more effective solution than we would have had if we had rushed to judgment. And wouldn't we have looked silly if we had reacted to a recommendation and moved an antenna that today we hear NTSB is not sure is the right solution?

There was an implication made that FAA is slow to enforce violations. And I submit to you that we have pursued the incident that occurred last March. We have written letters to all of our inspectors. And, yes, we have filed violations against the pilot of that aircraft. And we intend to fully pursue the incidents that occurred this past March.

Concerning the reported incidents 2 weeks ago, we're still involved in investigating. We've begun to process and review the data, and we have not been able to draw even preliminary conclusions from it. And I regret that we can't go into detail because of our investigation and it may be the basis for enforcement action.

But if I leave the subcommittee with any thought, I want to assure you that we will vigorously pursue all appropriate action both in the enforcement area and in the realm of any possible changes necessary to insure safety. And I think the committee should take credit for the actions that FAA has taken in this case, because, no, we didn't start last December or this January or February; I think what you saw start was in reaction to something that happened before your committee. And if you remember last July, when we talked about the same situation and we told you how we felt about the safety of the approaches, your reply, if I remember, then was, "But let's put it in the context of the real world. Let's understand that situations exist where pilots don't always fly the approaches designed, and why don't we see if we can understand why pilots deviate and what we can do to improve their performance."

And you said, "Go back and take another look." Well, we did go back and take another look, and I think we responded appropriately and will continue to do that.

Thank you very much.

[The prepared statement of Mr. Del Balzo follows:]

STATEMENT OF JOSEPH M. DEL BALZO, DIRECTOR, EASTERN REGION, FEDERAL AVIATION ADMINISTRATION, BEFORE THE HOUSE COMMITTEE ON SCIENCE AND TECHNOLOGY, SUBCOMMITTEE ON TRANSPORTATION, AVIATION, AND MATERIALS, CONCERNING THE SOUTHBOUND APPROACH TO WASHINGTON NATIONAL AIRPORT. MARCH 21, 1984.

Mr. Chairman and Members of the Subcommittee:

I appreciate the opportunity to appear before you to discuss the reviews the FAA has conducted of the southbound approach to Runway 18 at National Airport and the steps we have taken in order to add to the safety of that approach.

As Director of the Eastern Region, I am responsible, through my flight standards, air traffic, and airway facilities offices, for the development and maintenance of safe approaches to all airports in the region, including Washington National Airport. To assist me in answering your questions, I have with me today John Kern, Deputy Director of the Office of Aviation Safety, who is head of a task force comprised of headquarters, regional, and field personnel that is reviewing the southbound approach to National; Harry Hubbard, Manager of the National Airport Tower; Dave Venti, Manager of Data Systems at the tower; and Norbert Owens, Manager of the Eastern Region Air Traffic Division.

I would like to take this opportunity to summarize the events which have occurred and the actions FAA has taken concerning

the southbound approach to Runway 18 at National. On December 28, 1982, a Piedmont Airlines flight using the VOR/DME approach was reported by ground witnesses to have flown unusually close to the 390-foot USA Today building. In response to these reports, both FAA and NTSB conducted investigations into the incident. As a result of its investigation, NTSB submitted four safety recommendations to FAA on March 24, 1983. Three of these recommendations dealt with changes to the instrument approach--angling it away from Rosslyn; adding a visual descent point (VDP) to require pilots to maintain at least the minimum altitude until intercepting the Visual Approach Slope Indicator (VASI) glide slope; and changing the approach chart to depict the transition to visual flight over the Potomac River similar to that depicted on the current Localizer Type Directional Aid (LDA) approach, along with an advisory on maintaining minimum descent altitude until the visual descent point. The fourth recommendation was that the ARTS-III antenna array be moved to a site where it would provide more reliable operation of the Minimum Safe Altitude Warning (MSAW) system.

In July, FAA sent NTSB a letter indicating we did not concur with these recommendations based on our assessment that the procedures in place were safe and that the proposed changes would raise problems with environmental concerns and would not be consistent with the U.S. standard for Terminal Instrument

Procedures (TERPS) criteria. The FAA found no evidence that the MSAW equipment was not operating satisfactorily with the antenna in its present location.

In November, NTSB urged the FAA to reconsider its position, and subsequently, the Secretary of Transportation and the Administrator agreed to conduct another review of the safety of the approach. While the approach met all existing operational standards, it was determined to "go the extra mile" to see if changes could be made to improve the already high safety factor of the approach. Accordingly, a review team of specialists from Washington Headquarters, the Eastern Region, Washington Metropolitan Airports, and the Flight Inspection Field Office in Atlantic City conducted an additional review.

As a result of this re-examination of the approach, the team recommended some changes to the Administrator, who approved them last December. These changes included one of the original NTSB recommendations, and several other changes which respond to the intent of NTSB recommendations, and, we believe, go beyond what they had originally suggested, in terms of providing vertical guidance to approaching aircraft. We have worked closely with NTSB safety experts in developing these changes, and they have been fully supportive of our proposals.



The visual descent point (VDP) requested for the VOR/DME approach was adopted, and it took effect last Thursday, March 15. What it does is tell the pilot not to descend below the minimum descent altitude (MDA) prior to reaching a point 2.2 miles from the distance measuring equipment (DME) transmitter located at the VOR. The cockpit instruments will display this distance to the pilot to assist him in deciding when he can descend. The MDA is established at 720 feet, the USA Today building height is 390 feet, and the building is located about 2.6 miles from the DME antenna. Therefore, in addition to the horizontal separation the approach provides from the building, no aircraft should ever fly within 330 vertical feet of it.

We have published this new VDP in the current approach chart. In addition, we have sent a telex to all of our regions, requesting them to have the principal operations inspectors personally notify all affected carriers of this change. We intend to follow-up on this to make sure the carriers take action to inform their crews, paying particular attention to those carriers with flights into National. Having taken these steps to ensure that flight deck crews are aware of the new VDP, we intend to investigate and, if necessary, take vigorous enforcement action against any pilots who violate this procedure.

Another improvement is the development of a second Localizer Type Directional Aid (LDA) approach, following the same track as the VOR/DME approach. This is the most important change we are proposing to improve the safety of this approach, which is the one which has been the subject of attention concerning the USA Today building. For the first time, vertical guidance will be automatically provided to the cockpit, through the new state-of-the-art equipment which we will be installing. Upon installation of the glide slope, the ground proximity warning device--which is installed in all air carrier aircraft--will give the pilot an aural warning if the aircraft deviates from the glide slope. This will further ensure that proper altitude is maintained upon the final approach.

At the same time we install the new LDA approach, we will be upgrading the existing southbound LDA approach with the same state-of-the-art equipment. Our original expedited schedule called for installation of both LDA's by September 27th. As the Secretary announced last week, we have since pulled that forward to August 2nd. FAA believes that the installation of this solid state system will more than meet the intent of NTSB's recommendation that we alter the flight path for approaching aircraft.

A further step we are taking is the expansion of a lead-in light test program to help keep aircraft over the center of the

Potomac River. Originally planned for just Memorial Bridge, the expansion would add lights to the 14th Street/George Mason, Roosevelt, and Key Bridges. This program underscores the fact that, in addition to the vertical separation from the Rosslyn buildings, the approach is also designed to provide considerable horizontal separation. Thus, by strengthening the guidance to the pilot in both of these dimensions, we believe planes will be much less likely to deviate from the approved approach paths.

An issue which has been related to the concern over the southbound approach is the reliability of the Minimum Safe Altitude Warning (MSAW) system. This device is designed to alert the controller to a potentially unsafe condition by sounding an aural alarm and presenting a visual alert. In the wake of questions raised as to the reliability of the MSAW at National, this equipment was examined, and flight tests were conducted to ascertain that the equipment performed as intended. These reviews have uncovered no evidence of problems with the MSAW. Moreover, discussions with FAA electronic engineers have not revealed any unusual performance characteristics. However, we will continue to monitor the system to ensure its performance, and to determine if there any areas where the system can be improved.

Concerning the reported incidents two weeks ago, we are still involved in investigating those reports. We have begun the process of reviewing data, but have not yet been able to draw even preliminary conclusions from it. I regret that we cannot go into the details of our investigation, because it may be the basis for possible enforcement action. I want to assure the Subcommittee, however, that we will vigorously pursue all appropriate action, both in the enforcement area and in the realm of possible changes necessary to ensure safety. We believe that the changes we have proposed will be enough to accomplish this, but if we uncover any evidence that further steps are needed, be assured that we will take those steps.

Mr. Chairman, that concludes my prepared statement. At this time, my colleagues and I would be pleased to respond to your questions.

Mr. GLICKMAN. Thank you.

Mr. Del Balzo, let me ask you this question, though. Since—since you have—I think you were here last year, and others of the FAA were here last summer—I get this nagging feeling that, oh, that many times when the weather was inclement and you had a southerly approach to this runway, that there have—there may have been near misses—and I use that word not in the perhaps literal sense, but in the generic sense—to these buildings. Some reported, and some not reported.

I think that is the inference from what I am hearing from the NTSB, that airplanes have come too close to that building many times. In some cases, a warning system, your MSAW system or whatever system was alerted; in some cases it wasn't alerted; and in some cases it may have been alerted but the controller may have not taken the action that he was supposed to.

Now, that causes me great concern. What you're telling me here today is that you—you've changed the landing patterns and you're going to install some devices to try to improve the situation; you're raising the minimums to 1,100 feet during certain kinds of weather.

But I guess I still have this nagging feeling that we may have come near to catastrophe many times during the last year. And that worries me. It worries me because I fly that approach sometimes. And it also worries me about the fact there is I don't know how many million passengers a year fly in there.

Now, do you—are you telling me that you think that the NTSB has overstated the problem?

Mr. DEL BALZO. No, sir, not at all. I think a problem does exist when an approach is not flown properly. There are three different approaches to runway 18. There is what we call the visual approach over the river. There is what we call a VOR DME approach; that's the one that's in question.

And there is a third approach which is called an LDA approach. That's an approach that's made with precision guidance in both the lateral plan and the vertical plan.

Mr. GLICKMAN. The LDA approach, where does that come in on? Is that—

Mr. DEL BALZO. The LDA approach, the new—the LDA approach, as currently laid out, takes a path of 147 degrees. The VOR DME approach is on a path of 153 degrees. The VOR DME approach will take you directly, you know, just slightly to the right of the USA Today building.

The LDA approach, if flown correctly, would take you just about overhead that building.

Mr. GLICKMAN. OK. Now, go back to what I—

Mr. DEL BALZO. OK.

Mr. GLICKMAN [continuing]. Talked about before.

Mr. DEL BALZO. All right. The point that I was going to make in response to your comment was that the only approach where deviations are being noticed is on the VOR DME approach. And the reason that deviations are being noticed on that approach is because there is not precision vertical guidance, continuous vertical guidance, that a pilot can couple to on the airplane and fly it all the way down to the decision altitude.

The approach that we have taken is to give the pilot precision vertical guidance so that there will now be two LDA approaches. One approach will overlay this VOR DME approach that was giving us the problem. It allows the pilot to couple directly on—he doesn't have to hand-fly the airplane anymore—to a smooth signal that will take him down to the minimum decision altitude. And there should not be any altitude deviation once that system is in place.

There are a couple of things that you have going for you. No. 1, it's a duplication of an approach that's already in place that has never given us any deviation trouble. And second, there is a backup system that is now provided to the pilot, and it's called an aural alert, or for system caller ground proximity warning, so that in fact if he does deviate below the vertical guidance, a voice in the cockpit will tell him, "Fly up. Fly up. Fly up." And you don't have to rely upon any controller reaction.

Mr. GLICKMAN. When do you plan to put an MLS system at National?

Mr. DEL BALZO. First deliveries of MLS, we should start receiving in early 1986. And I think as you'll see in our implementation plan, Washington National is included in the first delivery.

Mr. GLICKMAN. It ought to be the first airport it's at, it looks like to me.

Mr. DEL BALZO. Yeah, maybe. The question is, if you install it at Washington National, No. 1, off the line, who will fly it? Who will

be equipped? Because the airlines are not required to equip themselves with this new avionics for some period of time.

I agree with you, you know, the benefits of the microwave landing system at Washington National are far superior to anything that we could do between now and then.

Mr. GLICKMAN. Because that MLS will allow pilots to make a curved approach.

Mr. DEL BALZO. Curved approach. No question, yes.

Mr. GLICKMAN. Senator Mathias has sent us a letter, and he has asked why a collision-avoidance device cannot be put on top of the USA Today Building. Would you care to comment? Would there be such a device available?

Mr. DEL BALZO. There may be. I don't think the concept that the Senator proposes is totally technically infeasible. It is built into the concept that we call TCAS today, that we are now investigating, that's part of our analysis. It's certainly not available off the shelf as a collision-avoidance today, as you well know, and I think it's something that may have a future application.

Mr. GLICKMAN. Are you aware of any new building plans at Rosslyn that may present similar problems than what we have right here with the USA Today Building?

Mr. DEL BALZO. I think you know—I heard someone mention today—that there is a second building adjacent to USA Today that is currently under construction, should be about the same height.

There is a third building, I recall, that is in the plan. Application for that building has been turned down by the State of Virginia, or the county.

We have reviewed the application for the second building, and we see no problem in meeting our standards.

Mr. GLICKMAN. How tall is the second building going to be?

Mr. DEL BALZO. I believe—the building that has been turned down, or the one that's under construction now?

Mr. GLICKMAN. It was——

Mr. DEL BALZO. The second?

Mr. GLICKMAN [continuing]. Both. Both.

Mr. DEL BALZO. The second is, I believe—and I stand to be corrected; maybe John knows better—I think it's the same height.

Mr. GLICKMAN. You see, you know, I guess the problem with all of this is that there is the natural inclination coming into a very marginal airport, which I repeat this airport is, and while it's operated safely because of that margin of error, that pilots want to inch below that level of clouds so they can see the airport.

I think it worries them, even experienced pilots, and the one thing that I am glad to see, and I hope that it's properly enforced, is this ceiling level has been raised enough so that it will, I think, protect passengers against pilots who may want to come down in marginal conditions.

Do you agree with that?

Mr. DEL BALZO. I agree with that. I flew on a 727 this morning. We did both approaches. We broke out at 1,100 feet. That was about the ceiling this morning. And again, if flown correctly, these new procedures, I believe that this situation should not develop again.



Mr. GLICKMAN. Now I would like to repeat something Mr. Wolf mentioned to you and asked you in an indirect way, if you have a 1,100-foot ceiling as opposed to—what was it before, 800 feet?

Mr. DEL BALZO. 720.

Mr. GLICKMAN. 700. This will make Washington National inoperative more days than it would otherwise be. Is that correct?

Mr. DEL BALZO. Let me ask—I am sorry that I did not introduce two people that were with me today. Norbert Owens is manager of the Eastern Region Air Traffic Division, and John Kern is also with me. John is from our Aviation Safety Office.

Let me ask Mr. Owens to respond to that.

Mr. GLICKMAN. Yes.

Mr. OWENS. Mr. Chairman, I believe you're indicating, or you feel, that the minimums on the approach are being changed. And that is in error. The approach minimums are not changing. The method of flying the approach is changing. But the minimum is 720 feet, and it will remain 720 feet as the minimum ceiling altitude for the approach.

Mr. GLICKMAN. OK. What I am trying to figure out is, though, will not the changes that you're talking about affect the ability of airplanes to land at that airport? The answer—you're shaking your head, "No."

Mr. DEL BALZO. No. The answer is, "No." The change that we're talking about will give us greater guarantees that the aircraft will pass over the obstruction at about 400 to 500 feet.

Mr. GLICKMAN. I see. At that particular level. They cannot be below that level.

Mr. DEL BALZO. That's true.

Mr. GLICKMAN. OK.

Mr. Boehlert.

Mr. BOEHLERT. Thank you, Mr. Chairman.

Mr. Del Balzo, I will have a few questions that I would like to submit in writing so that I could get a response.

[Information was provided to Mr. Boehlert.]

Mr. BOEHLERT. I have to leave very shortly. I am 5 minutes late for another hearing where I have to testify.

You still have the March 8 incidents under investigation, so you are probably not at liberty to talk in terms of that to any great degree. Is that correct?

Mr. DEL BALZO. That's true, sir.

Mr. BOEHLERT. But historically, it seems to me, my interpretation of what you're saying is that the system is—is working well; there are some judgments of individuals, not equipment, that are responsible here for near misses, if that's the correct terminology. Is that what I am hearing? Is that correct?

Mr. DEL BALZO. Yes, sir. I believe that what you're hearing is that the reason for the deviations taking place is the fact that we did not provide precise vertical guidance that could be flown continuously on that approach. And that deficiency is being corrected.

Mr. BOEHLERT. That's being corrected.

And what about—you probably heard my question of Mr. Burnett, and I think Mr. Carney's point was well taken, that just because NTSB says it doesn't mean it's gospel, and just because you don't agree with it doesn't mean you're in error. But do you feel

that there is a healthy interchange between the two? And where do you go when there's a stalemate in terms of arbitration? Does it have to end up in the Secretary's office?

Mr. DEL BALZO. No, sir. I don't think so. I think the record would show—in fact, I am not aware of stalemates. Now, it may appear at times that we take a long time in responding positively to a recommendation, but I assure you that it's not because we are footdragging. We have worked very closely with NTSB staff members from the time that we have received that report until the time that we have made our recommendations which have been accepted by not only the staff members but the chairman as well.

And I think the conflict that exists between the two organizations is, in fact, a healthy conflict.

Mr. BOEHLERT. And are you saying that the MSAW system is working properly?

Mr. DEL BALZO. I am saying that what we have, the investigations that we have conducted, MSAW has behaved the way it was designed.

Now, I don't claim to know everything about MSAW's performance. There is still some question in the minds of NTSB, and we pledged to work closely with NTSB in further investigating that problem, if there is a problem.

Mr. BOEHLERT. Well, I think we always look for the silver lining in everything. Do you feel that in some respects you've got a better rapport and a better relationship with NTSB as a result of—primarily as a result of our hearings last July—do you feel it's a healthy, constructive working relationship, or is it an adversarial relationship?

Mr. DEL BALZO. I don't think it's adversarial at all. I think it is constructive. I think the exercise that we have gone through with NTSB on this past year—again it may appear to be adversarial—I believe it has been very constructive and has resulted in the right solution.

Mr. BOEHLERT. One further question, and then I will leave.

It seems to me—and, boy, I am a neophyte; I am not a pilot, but, boy, I am a passenger and I take that at least twice a week, and I get sometimes nervous when I read some of the reports—but it seems to me all the problems are in the southbound approaches during inclement weather.

Is it totally unrealistic to think in terms of requiring northbound approaches during inclement weather? Is there just too much traffic to divert it for a northbound approach?

Mr. DEL BALZO. That's an operational question that I would hand to Mr. Owens.

Mr. OWENS. OK. There's a couple of answers to this question. First of all, the approach minimums for landing south are, if you look at other airports, would be considered to be very high as far as minimums are concerned. Generally speaking, the bad-weather runways support weather minimums of 200-foot ceilings and a half mile of visibility. In this case, we're talking about the minimum being 720-foot ceiling.

A pilot can fly, just to put it in perspective, a pilot can fly VFR—that is, on a see-and-be-seen basis—with a 1,000-foot ceiling. So

only some 280 feet more of ceiling height and you have VFR conditions.

So it's really not a bad-weather approach per se. It's not a, you know, sunshine clear-weather approach, but it's not a bad-weather approach.

What was the reference to your second part of your question?

Mr. BOEHLERT. Well, I am overly simplistic, I am sure, but I just suggested that we have all northbound approaches during questionable times, if that's the correct phrase to use.

Mr. OWENS. OK. Unfortunately, of course, in this part of the country, when the lows come moving across with the bad weather, they bring a south wind, and an aircraft has to land and take off into the wind. And that's the requirement to—to land to the south rather than to the north.

Mr. BOEHLERT. What happens when you find, Mr. Del Balzo, that the pilot has erred? You're the agency that meets out the discipline. Is that correct?

Mr. DEL BALZO. Yes, sir.

Mr. BOEHLERT. And what is the typical disciplinary measure?

Mr. DEL BALZO. I think it varies dependent upon the violation, whether or not the violation is flagrant and intentional, whether or not it's a minor violation, in our judgment.

I will tell you that in the case of, oh, the incident last March, we issued letters of warning to the pilots as an administrative warning.

Mr. BOEHLERT. Do you think that—what is the most severe reprimand?

Mr. DEL BALZO. Pulling of a certificate.

Mr. BOEHLERT. Pulling a certificate.

Do you think there's been something constructive out of all this attention to this in terms of the pilot's being more alert to the—to the seriousness of the matter and not—avoiding the temptation to come in low? And I know it's ideal to come in low and follow the river and get in there, and that's a nice easy way to do it. But there are some obstacles in the way. Do you think perhaps we're going to have a greater degree of cooperation from the pilots in avoiding that type of judgment call?

Mr. DEL BALZO. I don't think that cooperation from pilots was ever the question. I think there's a natural tendency of pilots to want to become visual as soon as they can, particularly when they don't have the vertical, precise vertical guidance to follow on an approach.

So it's likely to happen. And we talked about why do pilots tend to duck under. What's likely to happen is that as the pilot is coming on the approach, and maybe he's at 900 feet or he's at 1,100 feet, and he looks out and he makes visual contact for an instant, he thinks he's OK, and he's going to start to fly visually on a normal descent.

And then there's a good chance that he may lose contact because visibility is a variable and it's not constant. And he's going to tend to want to get lower and lower because he knows he's going to become visual any minute. And I think that has a good deal to do with the situations that have developed.

And on the other hand, if he had the precise vertical guidance, he would just never do that.

Mr. BOEHLERT. Thank you. No more questions.

Mr. GLICKMAN. Mr. Wolf.

Mr. WOLF. Thank you. Thank you very much.

I just wanted to make a couple of comments. I don't think NTSB has made any recommendation that would make the airport unsafe. Do you agree with that?

Mr. DEL BALZO. I agree with that, sir, yes, sir.

Mr. WOLF. And I have a little different perspective. Frankly, I think you all have been reluctant to do anything out at that airport with regard to seizing it and being bold and reducing the cap and putting more airplanes out to Dulles Airport. You've spent millions of dollars on the Dulles connector, which now is 25 minutes from downtown Washington out; the FAA and the department has been bickering with dropping the cap from 14.8 for the last almost 7 months.

So I think there has been some things. Now, nobody is criticizing you, and I am not criticizing you.

Mr. DEL BALZO. OK.

Mr. WOLF. I think the FAA is a very capable group of people. I happen to serve on the Aviation Committee, the Public Works Committee. You people are good people. I don't doubt that you are.

But I will tell you—and I have never used this, and I am not criticizing you, and I am not using my position to be—to attack you—but I really think there is an element of defensiveness in the way that you are.

And I think there is an adversarial relationship between the FAA and the NTSB. I have spent more time on these two airports than probably any other issue, and there is an adversarial relationship. There is when someone comes up and tells me, "Wolf, you know, you're really wrong," and I look at it and sometimes I am not totally wrong but I am a little wrong. And you just don't want to give. You just don't want to give. You don't want to acknowledge, because, "I am the expert, and I should know better."

And I think there is, and I think if anything comes out of this—and I think you are an expert, and I think your people are capable people; I have the highest respect. I think Lynn Helms was an outstanding administrator. I think your people are. But I do think there is a defensive attitude at the FAA on this issue that has existed for the last 3 years.

And if anything comes out of this hearing, is that in the spirit again, as I mentioned at the beginning, of kind of reconciliation, getting together and trying to do the best thing. So if the recommendation isn't quite what you'd really think it ought to be but it won't hurt and it might help, I think we're talking about life. This is not the safest airport in the Nation. There was an Air Florida crash, which happened for different reasons. There have been three potential near-misses.

So if a little extra paint is going to make a difference, a little extra money, I think we should—we should do it. And I know that my coming to these hearings isn't to criticize you, and I watched you when the NTSB was testifying, and writing notes down. And I



could tell how frustrated you are and wanted to get up and make a—I don't think anybody is here to really criticize you.

I just think that out of this, as Mr. Boehlert said, if you could get together and try to do the best thing for it.

My last comment, my only question was, how will you notify the pilots, the individual pilots? And is there a list of pilots, a list that's kept of pilots who fly into National on a regular basis versus somebody who just fills in every so often?

Mr. DEL BALZO. Good question. Mr. Kern.

Mr. KERN. Yes. We issued a telegram, as a matter of fact, on March 15, the day that these new procedures were implemented, to all of our representatives in our nine regions of the United States, and asked them to personally inform every air carrier and every captain that flies in and out of Washington National Airport about this particular procedural change and the implications of that particular change.

I think it was alluded to a little bit earlier. Not only did we emphasize the fact that proper altitude control was going to be required at National Airport, but that these approaches in fact were being monitored on radar, and we intended to take enforcement action if we saw pilots deviating from the approach procedures.

Mr. WOLF. I thank—and I thank you for your comments and for coming in—I thank the chairman for permitting me to be here and for having the hearing.

Mr. GLICKMAN. Well, the gentleman from Virginia and I have shared similar feelings about the operation of this airport, but we're not here to unduly press you. We're here because—as I said, I don't represent anybody from this area—I am here because of what I consider to be an airport in our Nation's capital that needs to be operated as safely as possible.

Let me ask you a couple of final questions. Are you aware of any computer software problems that would have an impact on the minimum safe altitude warning system?

Mr. DEL BALZO. I am not, sir; and that's something that will be addressed during our further analysis. But I am not aware of any.

Mr. GLICKMAN. OK. This question has been talked about several times, but why don't controllers pass the warnings on to the pilots? For example, it was disclosed that on March 8, of the 46 flights that apparently the gentleman from the NTSB referred to, nine alerted the MSAW system but only two—on two occasions were the pilots actually alerted. Why the discrepancy there?

Mr. DEL BALZO. Again, this has to do with the role of MSAW and the role of the controller in carrying out his function. The role of MSAW is to alert a controller about a possible safety problem. Given that alert, the controller can look out and assure himself that the situation is safe.

If you recall, the visibility this past week when that situation occurred was 6 miles. So a controller would look out. Two times he decided there was a problem and an advisory was necessary; seven times he looked out, satisfied himself that everything was OK and took no further action.

Mr. GLICKMAN. You mean he can physically look out a half or three-quarters of a mile down the river and make that judgment just like that?

Mr. DEL BALZO. I hope so.

Mr. WOLF. Would the chairman yield?

Mr. GLICKMAN. Yeah, I would be glad to yield.

But, first, yeah, I just want to ask you a question. Now, I may have my dates confused, but I thought the date that this—these two incidents happened was the date that we had that quick snow-storm that hit here in Washington, D.C. Was the visibility 6 miles?

Mr. DEL BALZO. Visibility was 6 miles, yes, sir.

Mr. GLICKMAN. At all times during that—

Mr. DEL BALZO. During that time, during that 1 hour, yes, sir.

Mr. GLICKMAN. Well, the hour was between when and when?

Mr. DEL BALZO. I believe—I don't recall exactly—I believe it was between 4 and 5 o'clock or about that time. Yes, sir.

Mr. GLICKMAN. The snow began about 5:15. I am not questioning you. I just—

Mr. DEL BALZO. Yes.

Mr. GLICKMAN [continuing]. Didn't think the visibility was 6 miles.

Mr. DEL BALZO. I believe you'll find that's what the record shows.

Mr. KERN. I landed myself about in the middle of that time-frame, and it was 6 miles-plus. Drove home back to Fairfax, and about 10 after 5, the visibility came down to zero.

Mr. GLICKMAN. Let me ask one final question. I remain concerned about your enforcement powers—

Mr. KERN. Yes.

Mr. GLICKMAN [continuing]. In dealing with the issue of obstructions near airports, because this same problem could exist at other places—and does—like San Diego and other airports.

Last year, when either you or Mr. Helms or somebody testified here, you talked about the fact that you were going to be doing a continuing study of your Federal air regulations to see if you might need additional powers under the statute or what could be done short of, let's say, barring an approach pattern, perhaps giving you some additional authority in the zoning process.

I wonder if you might have any comments on that.

Mr. DEL BALZO. Your statement is correct. We do not have enforcement powers. A proponent who comes to us with an application for construction in the USA Today, we will compare the construction that's being proposed, to our safety criteria. In this case, the height of USA Today met our safety criteria. In fact, it's something like 74 feet below penetration of the safety—of the safety descent.

If it penetrated, if it did violate criteria, we would make that determination, but we would not have the power to prevent that structure from being built.

What we have going for us is an insurance picture. Very few proponents will construct something that we have declared to be a hazard, because there is no way they're going to get insurance. So that has not been a problem for us. Although we don't have the power to enforce, we have not found that to be a problem.

Mr. GLICKMAN. The final question is—I asked Mr. Burnett the same question—would you feel comfortable, Mr. Del Balzo, having your office on the top floor of that building?

Mr. DEL BALZO. My office and my apartment, yes, sir.



Mr. GLICKMAN. Thank you.

We thank you for your testimony today. We thank all the witnesses. This committee, subcommittee, is going to continue to monitor this issue. We're not going to let it die. And I am not sure we're going to have any more hearings scheduled over the short term, but we want to make sure that your office keeps in contact with this committee and subcommittee to insure that there is compliance and followthrough with its recommendations that you have made to improve the landing patterns here.

Mr. DEL BALZO. Thank you very much.

Mr. GLICKMAN. This hearing stands adjourned.

[Whereupon, at 4:35 p.m., the subcommittee was adjourned.]

## APPENDIX

### DEPARTMENT OF TRANSPORTATION NEWS RELEASE AND WASHINGTON POST ARTICLES



U.S. Department of  
Transportation

# News:

Office of Public Affairs  
Washington, D.C. 20590

FOR IMMEDIATE RELEASE  
Tuesday, April 17, 1984

FAA 12-84  
Contact: Mari Maseng  
Tel.: (202) 426-4570  
Fred Farrar  
Tel.: (202) 426-8521

#### FAA PLANS SAFER APPROACH TO NATIONAL AIRPORT, DOLE SAYS

Secretary of Transportation Elizabeth Hanford Dole today said the Federal Aviation Administration plans to install a new electronic landing aid to further increase the safety of bad-weather approaches to National Airport.

The guidance equipment's electronic beam would keep incoming aircraft farther away from the Rosslyn, Va., area and eliminate the S-turn they now make over the Potomac River. The device would be located at the Anacostia Naval Air Station.

"The landing aid would make it easier for pilots to fly the approaches to National and further reduce the concerns residents of Rosslyn have about those approaches," Secretary Dole said. "The action reflects my determination to make the approaches as safe as is technologically possible."

"The new equipment would be in addition to upgraded landing aids scheduled for installation at the airport by August 2, which themselves represent an improvement over what is now available," she said.

Placement of the "localizer" landing aid as a permanent installation at Anacostia would give pilots an electronic beam to follow in bad weather, placing aircraft farther east of the USA Today building, the tallest in Rosslyn.

The electronic signal also would allow pilots to eliminate one of two turns they have to make after passing Rosslyn as they follow the river to the airport.

The Secretary said she is receiving full cooperation from U.S. Navy officials who must approve the use of air station land. The FAA is discussing with the Naval District Washington the proposed leasing of a small parcel of land at the river's edge across from the airport. Survey teams are working to determine the best possible site for the landing aid.

- more -

Implementation of the plan is subject to final engineering and environmental assessments, and is expected to be in operation by the end of this year.

The previously announced installation of upgraded landing aids at National Airport is proceeding on schedule to an Aug. 2 completion and will replace the existing guide beam with a more precise one using modern, solid-state electronics. It also will provide an electronic glide slope that pilots can follow to stay at the required altitude throughout the approach.

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US Department  
of Transportation  
Federal Aviation  
Administration

1400 Independence Ave. S.W.  
Washington, D.C. 20591

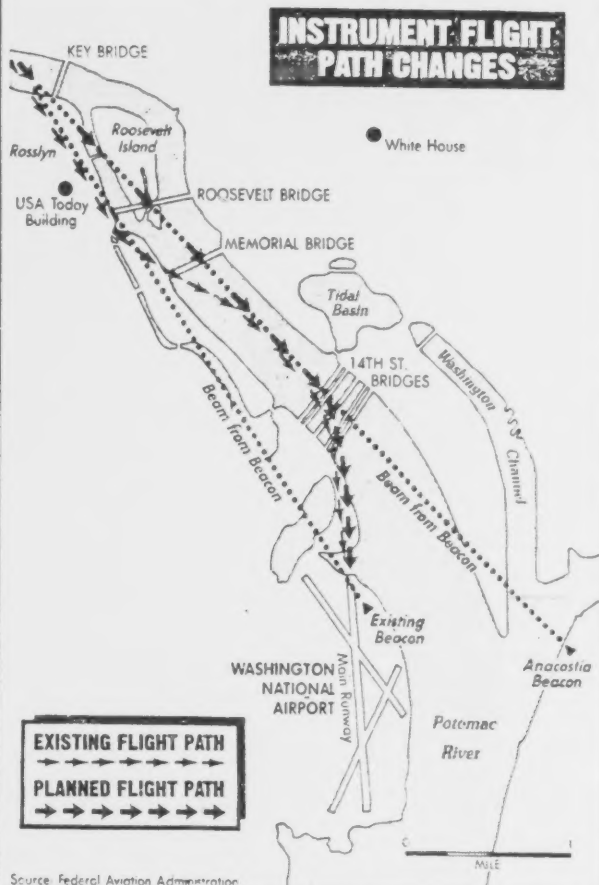
Dr. J. Sullivan  
Room 1000, P.O. Box 8000

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Administration  
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COMMUNICATIONS SECTION  
COMM. DIV. 800 W. 1000  
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1400 INDEPENDENCE AVE. S.W.  
WASHINGTON, D.C. 20591

## ON THE BEAM

WASHINGTON POST  
4-19-84

By Dave Cook—The Washington Post

A new electronic beacon will route planes landing at National Airport about 800 feet farther from the USA Today building in Rosslyn during bad weather landings starting this summer, according to the Federal Aviation Administration. It also will simplify the approach by requiring only one turn.

The beacon, to be installed at the old Anacostia Naval Air Station, will go into operation sometime after July and replace an older device that took planes closer to the building and required pilots to execute a complex S-turn at low altitude over the Potomac River bridges.

The FAA is installing the equipment in response to repeated reports that jets have passed dangerously close to the USA Today building during instrument approaches to National.

The new path, intended for bad weather and low clouds, will be used only for about one percent of all landings at National. The other planes will continue to use other instrument paths or fly visually.

WASHINGTON POST, 3-31-84

# Nine Jets Flew Too Close To Rosslyn in Snowstorm

By John Burgess  
Washington Post Staff Writer

The number of jet airliners that appear to have descended too quickly near high-rise buildings in Rosslyn during a snowy afternoon early this month, first thought to be two, then four, was revised yesterday by federal authorities to nine. That was nearly one of every three that passed during a one-hour period.

A Federal Aviation Administration spokesman said the agency has sent letters to 12 of the planes' crew members, telling them they are being investigated for apparently breaking flight rules that govern the approach to National Airport. Another seven or eight crew members probably will be sent letters.

The letters give the flight crew members 10 days to respond. After that, if the FAA concludes that they did break the rules, punishment can range as high as revocation of their aviation licenses, plus \$1,000 fines. The pilots can appeal.

One of the jets that allegedly descended too soon while making a landing approach along the Potomac River on March 8 was operated by Eastern Airlines and another by Pan American World Airways.

According to FAA flight manuals, pilots making instrument approaches in bad weather are supposed to maintain a gradual descent down the river that puts them at about 825 feet as they pass the USA Today building in Rosslyn.

The flight data recorder on board the Eastern jet indicated that up-

stream from Rosslyn the plane already had descended to about 365 feet, or approximately 25 feet below the roof of the 31-story USA Today building. It was climbing as it neared the building, and may have flown directly over it.

The incidents occurred between 4 p.m. and 5 p.m. during a snowstorm that forced pilots to use instruments rather than fly visually. After receiving telephone calls from witnesses in Rosslyn, the National Transportation Safety Board began an investigation and announced that two planes, the Eastern and Pan Am jets, appeared to have flown too low.

The following week, safety board chairman Jim Burnett told a congressional hearing further inquiry showed that at least four planes apparently had been flying too low. Yesterday's disclosure again revised the number upward, to nine of the 26 planes that made the approach to the airport during that hour.

The original reports led Transportation Secretary Elizabeth H. Dole to order the FAA to speed up installing new guidance equipment for the river approach and to put "lead-in" lights onto Key, Theodore Roosevelt Memorial and the 14th Street bridges.

Virginia Sen. Paul Triple and Rep. Frank Wolf, both Republicans, have asked that strobe lights be installed on the building's roof as an additional safeguard. The FAA says it is studying this, but is concerned that, with lights already being placed on the bridges, the roof lights might confuse pilots.